WORCESTER

Bosch Group

OIL HEATSLAVE 26/32

CONVENTIONAL FLUE AND ROOM SEALED BF FLOOR STANDING COMBINATION BOILER FOR CENTRAL HEATING AND MAINS FED DOMESTIC HOT WATER

INSTALLATION AND SERVICING INSTRUCTIONS

BOILER OUTPUT

Domestic Hot Water and Central Heating

26/32 **MINIMUM 26 kW** (89,000 Btu/h)
MAXIMUM 32 kW (109,000 Btu/h)

THESE INSTRUCTIONS APPLY TO UK MODELS ONLY

THESE INSTRUCTIONS ARE TO BE LEFT WITH THE APPLIANCE

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1. Installation Regulations

1.1 General installation information and advice may be obtained from the Oil Firing Technical Association for the Petroleum Industry (OFTEC). Training courses are also offered by OFTEC, leading to inclusion on their list of registered engineers.

1.2 The appliance should be installed by a competent person. The person installing the appliance should be aware of the Health and Safety at Work Act and take appropriate action to ensure that the regulations are adhered to. In order to give optimum efficiency and trouble free operation the appliance should be commissioned by a qualified engineer. OFTEC recommends the use of registered engineers for the commissioning of oil-fired burners.

1.3 The manufacturers notes must not be taken, in anyway, as overriding statutory obligations.

1.4 The compliance with a British Standard does not, of itself, confer immunity from legal obligations.

In particular the installation of this appliance must be in accordance with the relevant requirements of the following British Standards and regulations in respect of the safe installation of equipment.

BS 5410: part 1: 1997 Code of practice for Oil Fired Boilers.

BS 799: part 5: 1987 Specification for Oil Storage Tanks.

BS 7593: 1992 Code of Practice for treatment of water in domestic hot water central heating systems.

BS 5449: part 1: 1990 Code of practice for Forced Circulation Hot Water and Central Heating for Domestic Premises.

BS 7074: part 1: 1989 Application, selection and installation of expansion vessels and ancillary equipment for sealed water systems.

BS 7671: IEE Wiring Regulations, current edition.

The Building Regulations Part J England and Wales; Part F, Section III Scotland; Part L Northern Ireland.

Local water company bye-laws.

The Control of Pollution (Oil) Regulations.

1.5 To ensure that the installation will perform to the highest standards, the system and components should conform to those mentioned in the instructions.

2. General Information

2.1 These instructions cover both conventional flue (CF)/low level discharge (LLD) and room sealed balance flue (RS) appliances.

2.2 The Worcester Oil Heatslave 26/32 appliance covered in these instructions has been designed to serve domestic central heating and mains pressure domestic hot water requirements, ranging from 26 kW to 32 kW.

2.3 The RS balanced flue appliance forms a fully room sealed system by surrounding the burner with a unique, fully sealed, push fit box. This causes the combustion air to be drawn through a factory sealed air duct formed at the rear and underside of the boiler. The sealed burner gives excellent acoustic noise reduction and alleviates the need for an air brick to be located in the boiler room.

Because the balanced flue system does not rely on the cabinet panels to form the room seal, combustion readings can be taken from the flue outlet plate as on a conventional appliance , and the cabinet panels can be easily removed during installation thereby preventing any damage.

2.4 The boiler is factory set to the mid range output and can be altered, if necessary, by adjusting the burner as specified in tables 2 to 3. The low level discharge and room sealed models are only suitable for use with 28 second Kerosene heating oil.

NOTE: It is a mandatory requirement of the building regulations that only 28 second kerosene is used on low level discharge flues.

2.5 The conventional flue 26/32 model may be converted to burn 35 second gas oil by changing the nozzle and burner setting as specified in Table 2.

2.6 A colour co-ordinated twin channel programmer can be fitted to the facia panel. This is available from Worcester Heat Systems as an optional extra.

2.7 Principle appliance components. See Fig 3 and 4.

Oil Fired Burner

A fully automatic oil fired pressure jet burner is used to supply heat to the boiler. The burner can be set to the output requirements as detailed in Tables 2 and 3.

Heatslave Tank

The Heatslave tank is a heatbank containing 46 litres (10 gallons) of primary hot water. The tank temperature is controlled by the Domestic Hot water Control Thermostat and is variable between 55°C and 80°C.

Domestic Hot Water Heat Exchanger

A Water to Water heat exchanger is located on top of the Heatslave tank. Primary water is pumped from the Heatslave tank to the heat exchanger whenever there is a flow of domestic water through a hot water tap. The domestic water thereby extracts the heat from the heatbank giving mains pressure domestic hot water. The domestic hot water temperature can be increased by reducing the water flow rate at the tap and/or adjusting the Domestic Hot Water Control Thermostat to a higher setting.

Diverter Valve

A motorised diverter valve is located on the pump outlet. The valve is normally closed to the primary circuit and is powered open when there is a demand for central heating at a room thermostat or a demand for heat via the Central Heating Control Thermostat.

Pump

An integral circulating pump is incorporated within the appliance casing. This serves the functions of both the central heating circuit and the Heatslave tank. The pump is factory set to Setting 3. This should not be adjusted, since this would impair the domestic hot water performance.

Flow Switch

The domestic mains water inlet is connected to a flow switch which detects when a domestic hot water tap has been opened. This activates the burner and pump when the Domestic Hot Water mode or the Central Heating and Domestic Hot Water mode is selected. If the Facia mounted operating switch or programmer (if fitted) is set to OFF or set to Heating On only, then only the pump will be activated.

Pump Overrun

A pump overrun facility has been incorporated into the control board which allows excess heat to be dissipated to the hot water circuit when there is a demand for central heating via the user operating switch (or programmer where fitted) or to the Heatslave tank. This prevents the possibility of the boiler overheating.

Expansion Vessel

A 12 litre expansion vessel is included within the appliance cabinet.

Manual Reset Overheat Thermostat. See Figs. 3 and 4.

An overheat thermostat is located on the underside of the electrical panel and is accessible by removing the cabinet front panel. If a boiler overheat condition arises, the burner will remain inoperative until the thermostat button is reset.

2.8 OPERATION

The appliance is supplied with a facia mounted operating switch to allow the selection of hot water in the upper position or central heating and hot water in the lower position.

Central Heating and Domestic Hot Water Mode

The appliance will supply heat to the central heating system as required. The water supplied to the central heating circuit can be set to the desired temperature by adjusting the Central Heating Control thermostat.

The Heatslave tank will maintain the temperature set on the Domestic Hot Water Control Thermostat. Demand by the Domestic Hot Water Control Thermostat or a demand for hot water at a tap or shower will override the central heating requirement for the period of the demand. This will generally have no significant effect on the average room temperature.

When the dwelling and boiler are to be heated from cold, heating can be achieved more rapidly by turning the Domestic Hot Water Control Thermostat fully anti-clockwise for the duration of the warm up period. This will prevent the Heatslave tank taking priority for the tank warm up period of approximately 20 minutes.

Domestic Hot Water Mode

The Heatslave tank will maintain the temperature set on the Domestic Hot Water Control Thermostat.

Central Heating Mode

This mode only applies where a two channel programmer has been fitted to the system

The appliance will operate as a conventional oil fired boiler. The water supplied to the central heating circuit can be set to the desired temperature by adjusting the Central Heating Control Thermostat.

A demand for domestic hot water at a tap or shower will override the central heating requirement for the period of domestic hot water demand. This will allow any residual heat in the Heatslave tank to be utilised for domestic hot water purposes.

NOTE: If the Heatslave tank is cold, then no domestic hot water will be obtained from the system.

Off mode

The central heating system will remain off unless there is a demand via the frost thermostat (when fitted), whereby the frost thermostat will activate the pump and burner until the demand is satisfied.

The burner will remain inoperative in all other circumstances.

If a demand for domestic hot water is made at a tap or shower, primary water will be pumped from the Heatslave tank through the domestic hot water heat exchanger. This will provide a limited output of domestic hot water depending on the amount of heat stored in the Heatslave tank.

This function will be found useful during periods where it would be considered undesirable or uneconomical to keep the Heatslave tank constantly hot, but where there may be a demand for small quantities of domestic water for hand washing etc. This would include overnight periods and any periods of very low domestic hot water demand (eg during the summer months). In these circumstances the Heatslave tank can be charged up to maximum temperature once or twice a day as required using the programmer in the Domestic Hot Water mode and with the Domestic Hot Water Control Thermostat set to maximum.

3. Technical Data

Table 1

		SPECIFICATIONS
Model		**26/32**
POWER SUPPLY		230V/240V 50 Hz
HEATING FLOW		28mm
HEATING RETURN		1¼" BSP
COLD WATER MAINS INLET		15mm
DOMESTIC HOT WATER OUTLET		22mm
CENTRAL HEATING VENT		1¼" BSP
FUEL LINE		10mm Compression
FLUE REQUIREMENT	CF	125mm (5in.)
	RS	Balanced Flue Kit (Sec. 7.3)
HEARTH TEMPERATURE		Below 100°C
PRIMARY WATER CAPACITY (TOTAL)		76.1 litres (16.7 gal.)
MAXIMUM STATIC HEAD		30 m (98 ft.)
MINIMUM STATIC HEAD		1 m (3.3 ft.)
WEIGHT	CF	190Kg (418lbs)
	RS	197Kg (434lbs)
OVERALL APPLIANCE HEIGHT		855mm (33.7in)
OVERALL APPLIANCE WIDTH		670mm (26.4in)
OVERALL APPLIANCE DEPTH		600mm (23.6in)
BURNER		Electro Oil Sterling 40
WATER SIDE RESISTANCE 10°C Difference		120 mbar
WATER SIDE RESISTANCE 20°C Difference		40 mbar
EXIT FLUE GAS MASS FLOW		57 kg/hr
MAXIMUM DOMESTIC HOT WATER FLOW RATE		Unrestricted 22 litres/min recommended
FLOW RESTRICTOR		NOT FITTED
MAX. DOMESTIC HOT WATER TEMPERATURE RISE FOR 90 litres (20 gallons) DRAW OFF		40°C at 22 litres/min.
MIN. INLET DOMESTIC WATER PRESSURE (DYNAMIC) FOR MAXIMUM HOT WATER FLOW		0.6 bar at 22 litres/min.
CENTRAL HEATING CONTROL THERMOSTAT RANGE		55°C minimum Cut In to 82°C maximum Cut Out
DOMESTIC HOT WATER CONTROL THERMOSTAT RANGE		55°C minimum Cut In to 80°C maximum Cut Out
CENTRAL HEATING AND DOMESTIC HOT WATER CONTROL THERMOSTAT DIFFERENTIAL		5°C
BOILER HIGH LIMIT THERMOSTAT SET POINT		95 ± 2°C
MANUAL RESET OVERHEAT THERMOSTAT		110 +0–6 °C Cut-out

26/32 Table 2. Electro Oil Sterling 40 Burner (See Fig. 21) **Convential Flue Appliance (CF/LLD)**

NOMINAL BOILER RATING AT NORMAL OPERATING TEMPERATURE											
Fuel	Nozzle ‡	Pump Pressure (p.s.i.) †	Fuel Flow Rate		Flue Gas Temp. (°C)**	$\%CO_2$	Approx. Air Setting	Appliance			
								Input		Output	
			Kg/h	l/h				kW	Btu/hr	kW	Btu/hr
28 Sec. Kerosene	0.85 80°EH	110	2.36	2.99	225	11.0-11.5	11	28.5	97,000	26	89,000
28 Sec. Kerosene	0.85 80°EH	130	2.66	3.37	240	11.0-11.5	12	32	109,000	29	99,000
28 Sec. Kerosene	1.00 80°EH	130	2.95	3.74	245	11.5-12.0	16	35.5	121,000	32	109,000
35 Sec. Gas Oil*	0.50 80°H	260	2.44	2.87	220	11.5-12.0	9	28.5	97,000	26	89,000
35 Sec. Gas Oil*	0.55 80°H	265	2.76	3.25	235	11.5-12.0	14	32	109,000	29	99,000
35 Sec. Gas Oil*	0.55 80°H	330	3.06	3.60	240	12.0-12.5	16	35.5	121,000	32	109,000

26/32 Table 3. Electro Oil Sterling 40 Burner (See Fig. 21) **RS balanced Flue Appliance**

NOMINAL BOILER RATING AT NORMAL OPERATING TEMPERATURE											
Fuel	Nozzle ‡	Pump Pressure (p.s.i.) †	Fuel Flow Rate		Flue Gas Temp. (°C)**	$\%CO_2$	Approx. Air Setting	Appliance			
								Input		Output	
			Kg/h	l/h				kW	Btu/hr	kW	Btu/hr
28 Sec. Kerosene	0.85 80°EH	110	2.36	2.99	225	11.0-11.5	10	28.5	97,000	26	89,000
28 Sec. Kerosene	0.85 80°EH	130	2.66	3.37	240	11.0-11.5	15	32	109,000	29	99,000
28 Sec. Kerosene	1.00 80°EH	130	2.95	3.74	245	11.5-12.0	20	35.5	121,000	32	109,000

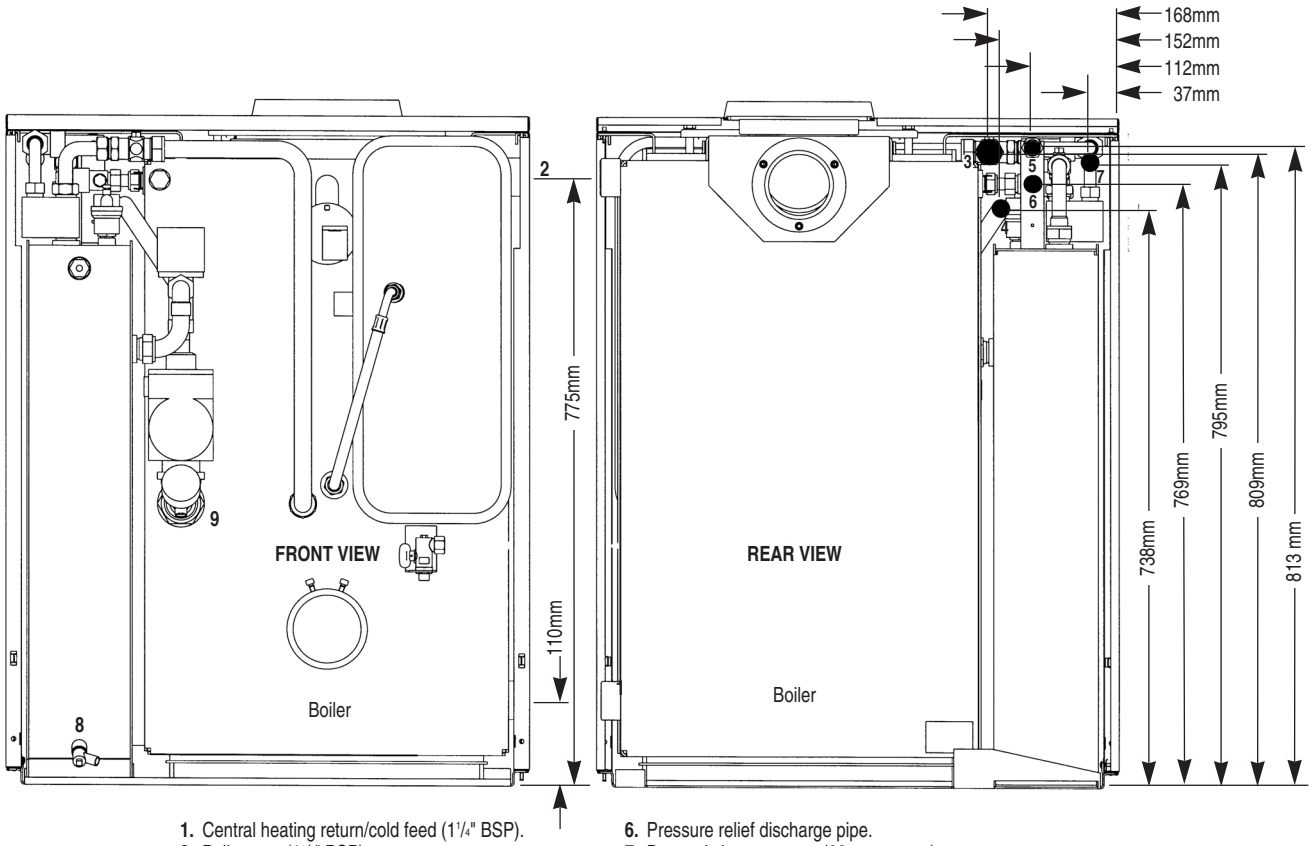
* **NOTE:** For use on conventional flue only.

** **NOTE:** The flue gas temperature is measured in the gas sampling hole on the flue outlet plate. The probe should be inserted to a depth of 50mm and angled towards the flue outlet. The temperature measured is not an absolute flue gas temperature and is for general guidance purposes only!

† **NOTE:** The pump pressure given is for general guidance only as variations in nozzle output can be up to ± 15%. It is, therefore, essential that the air is adjusted to give the correct CO_2 value.

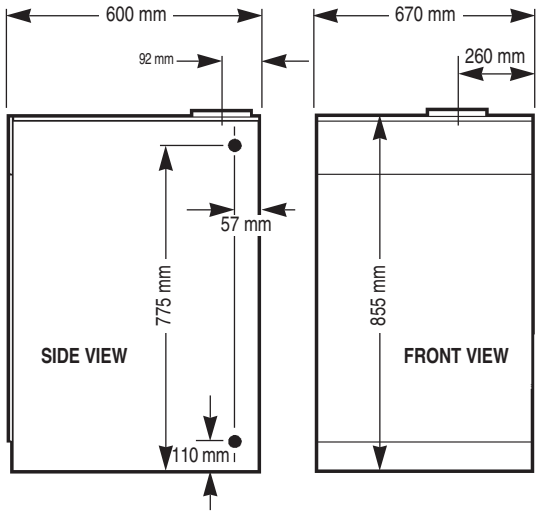
‡ **NOTE:** The nozzle type used on 28 Sec. Kerosene outputs are nozzles calibrated specifically for use with 28 Sec. Kerosene which gives less variation in nozzle output than the standard 35 Sec. Gas Oil nozzles. However, if a 28 Sec. Kerosene nozzle is not available at servicing or commissioning it is appropriate to install a 35 Sec. Gas Oil nozzle providing the output, spray angle and pattern of the nozzle is the same as the 28 Sec. Kerosene nozzle (e.g. 0.7580°EH may be replaced with a 0.7580°H).

Fig. 1. Pipework Dimensions.



1. Central heating return/cold feed (1¼" BSP).
2. Boiler vent (1¼" BSP).
3. Alternative central heating return tapping.
4. Central heating flow (28mm compression).
5. Mains cold water in (15mm compression).
6. Pressure relief discharge pipe.
7. Domestic hot water out (22mm copper).
8. Heatslave tank drain.
9. Pump manifold drain.

Fig. 2. Principal Dimensions.



4. Siting the Appliance

4.1 The appliance is not suitable for external installation unless a suitable enclosure is provided.

4.2. The appliance should be positioned on a non combustible solid base as near to the flue location point as possible. Care should be taken to ensure that the appliance is level; use packing at the corners where necessary.

4.3 When fitting a LLD or RS model, the rear of the appliance must be positioned against an external wall such that the flue terminal can safely discharge the flue gases as described in Section 7.

4.4. The following clearances must be left to allow access for installation and servicing:

(a) Above - 300mm
(b) In front - 600mm
(c) Right and left hand side - sufficient for panel removal and access to pipe connections where required.

5. Removal of the Cabinet

See Figs. 3 and 4.

For installation and servicing of the appliance the cabinet panels should be removed as follows:

5.1. Remove the cabinet top panel by lifting squarely upwards to release the four ball stud connections.

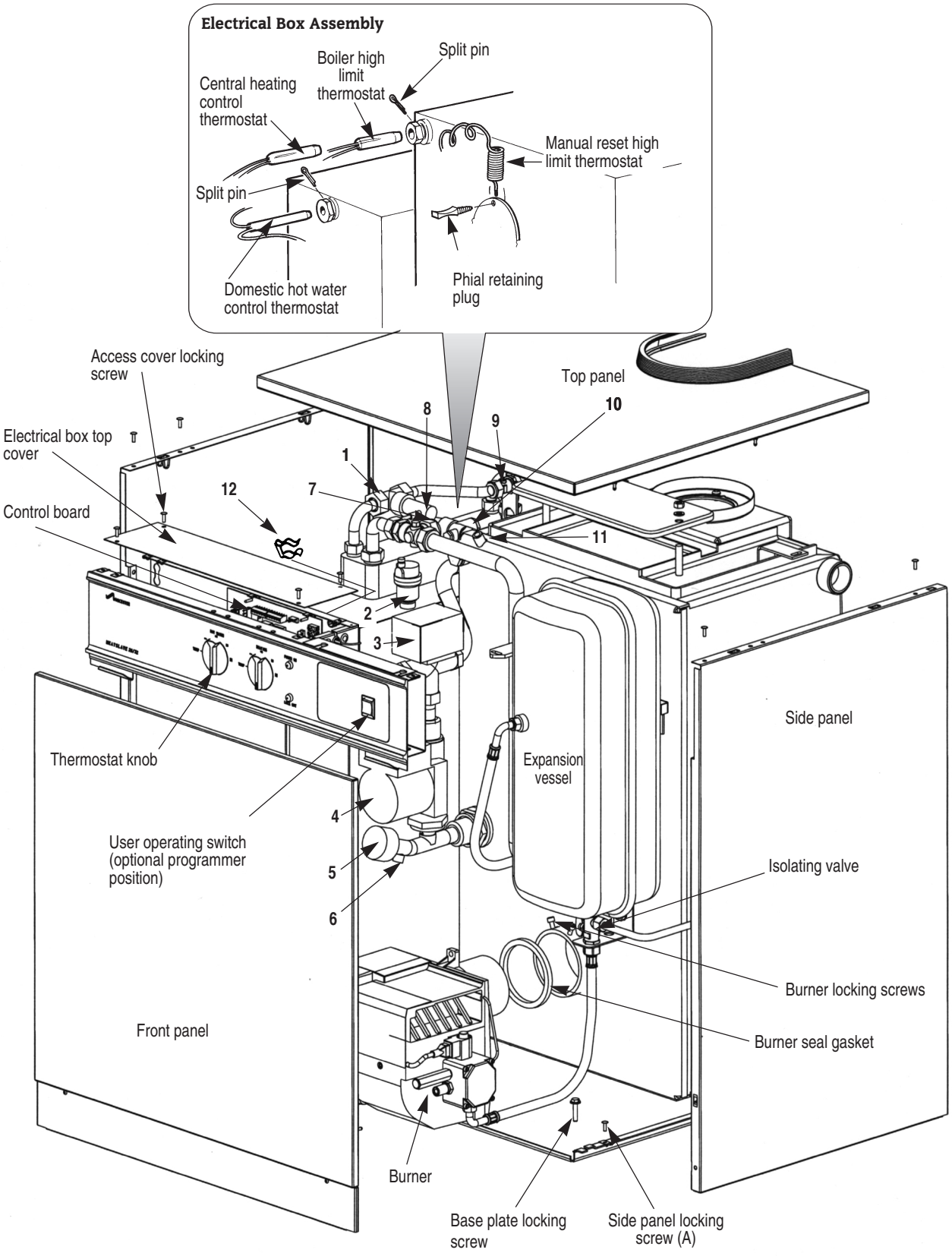
5.2. Remove the front panel by pulling the bottom of the panel forwards to release the ball studs and lifting the panel upwards and forwards to release it from its supporting ledge.

5.3. The side panels are removed by firstly following procedures 5.1 to 5.2 as described above, then remove screw (A) from the side panel base and the three screws located in the upper flange of each side panel. Ease the panel clear of the electrical control box and slide forwards to release from the locating lugs on the base plate.

5.4 The electrical box can be removed by undoing the four screws in the top access cover and then removing the wing nut on the underside of the electrical box. The thermostat phials should be carefully removed from the phial pocket, and the electrical box placed in a safe place taking care not to kink the thermostat capillary tubes.

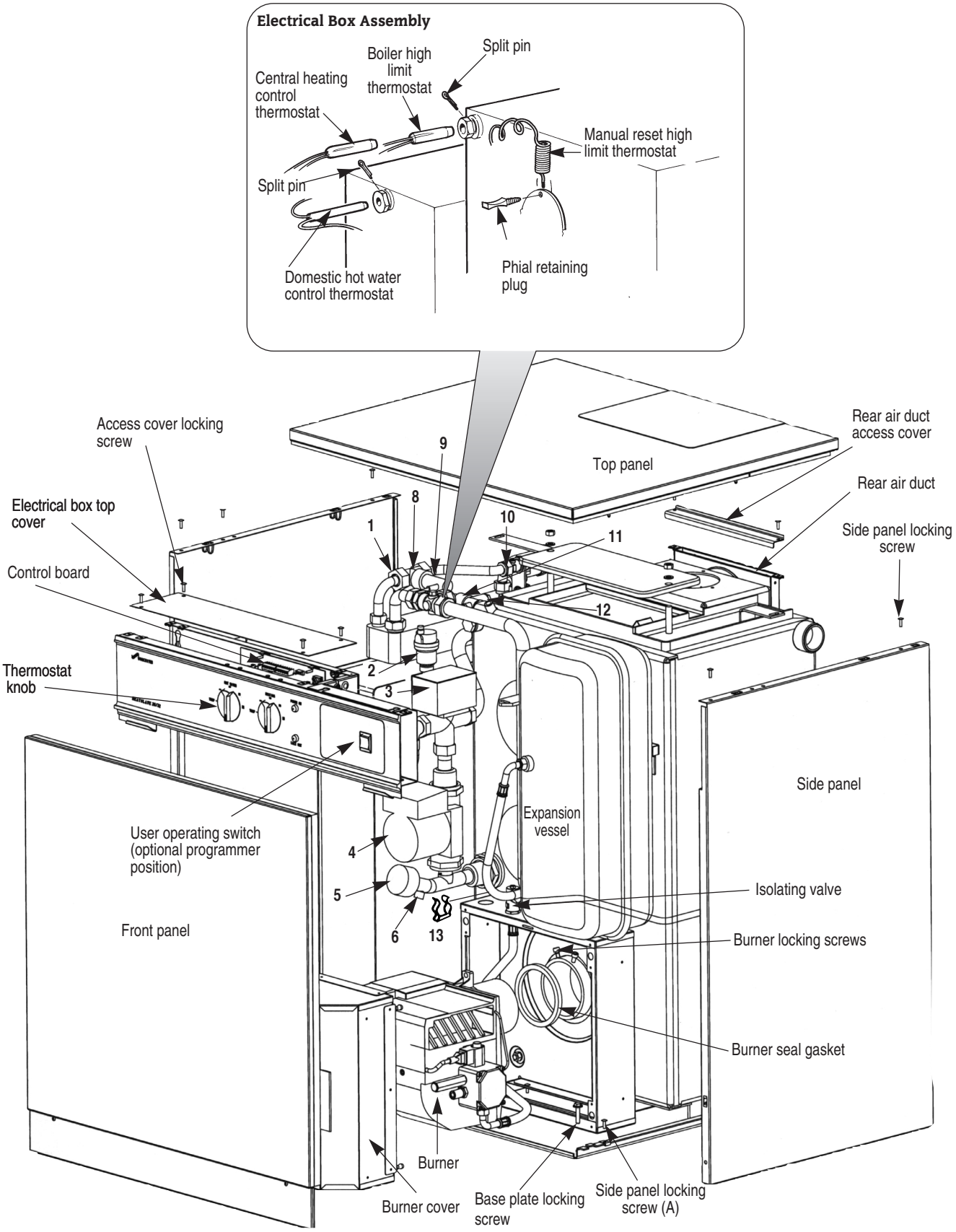
5.5 On the RS balanced flue model, remove the burner box cover by pulling forwards to release the ball studs. This will be found easier by pulling on one side of the handle first to release two ball studs and then repeating on the other side. Take care not to pivot the remaining two ball studs too far around as this will cause damage to the spring clips.

Fig.3. Conventional Flue Appliance (CF/LLD).



1. Hot water check valve.
2. Automatic air vent.
3. Diverter valve.
4. Pump.
5. System pressure gauge.
6. Pump manifold drain.
7. Alternative central heating return tapping.
8. Flow switch.
9. Mains cold inlet isolating valve.
10. Pressure relief valve.
11. Air vent.
12. Fire valve clip.

Fig.4. Room Sealed Balanced Flue Appliance (RS).



1. Hot water check valve.
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6. Pump manifold drain.
7. Fire valve clip.
8. Alternative central heating return tapping.
9. Flow switch.
10. Mains cold inlet isolating valve.
11. Pressure relief valve.
12. Air vent.
13. Fire valve clip.

6. Air Supply

OPEN FLUE MODEL (CF/LLD)
This includes conventional flue and standard low level and high level horizontal discharge kits.
6.1 In order to ensure clean and efficient combustion, an adequate supply of air must be delivered to the combustion chamber. To provide sufficient air, a suitable inlet should be provided into the room or space in which the appliance is situated, the size of which is detailed in Table 6. An air brick or other form of continuous air supply may have to be built into the installation in order to ensure an adequate supply of air.
6.2 If the appliance is to be installed in a confined space or compartment, two air vents are required, one at high level and one at low level. The minimum free area of each vent is given in Table 7 and depends whether the air is taken from another room or from outside the building. Where the air is taken from another room that room must contain an air inlet as described in 6.1.
6.3 There must be sufficient clearance around the appliance to allow proper circulation of ventilation air. The clearances required for installation and servicing will normally be adequate for ventilation. See Section 4.4.

ROOM SEALED BALANCED FLUE MODEL (RS)
6.4 The appliance does not require a separate vent for combustion air.
6.5 Installation in cupboards or compartments require permanent vents for cooling purposes, one at high level and one at low level, either direct to outside air or to a room. Both vents must pass to the same room or be on the same wall to the outside wall to the outside air. The minimum air vent free area is given in Table 8.
6.6 There must be sufficient clearance around the appliance to allow proper circulation of ventilation air. The clearances required for installation and servicing will normally be adequate for ventilation. See Section 4.4.

Table 6. Minimum Combustion Air Inlet Free Area for Open Flue appliances

APPLIANCE	AREA OF AIR INLET	
	cm^2	$in.^2$
26/32	176	27.5

Table 7. Minimum Air Vent Free Area for Open Flue appliances installed in a compartment.

Appliance model	Ventilation to room or internal space		Ventilation to outside	
	High Level	Low Level	High Level	Low Level
26/32	352cm^2	528cm^2	176cm^2	352cm^2

Table 8. Minimum Air Vent Free Area for Room Sealed appliances installed in a compartment.

Appliance model	Ventilation to room or internal space		Ventilation to outside	
	High Level	Low Level	High Level	Low Level
26/32	352cm^2	352cm^2	176cm^2	176cm^2

7. Flue System

A flue system must be provided in accordance with BS5410: Part 1 and the Building Regulations, part J, Section J2.
7.1 Conventional Flue (CF). See Fig 5.

Conventional Flue Diameters: 26/32 – 125mm (5in.)

The boiler is fitted with a conventional flue locating spigot. The flue pipe fits into the spigot and should be correctly sealed with fire cement.
NOTE: The flue size must never be reduced from the take-off diameter. An increase in flue size is permissible provided that the joint is sealed correctly.
The flue should be vertical and contain as few bends as possible.

Fig. 5. Flue Installation.

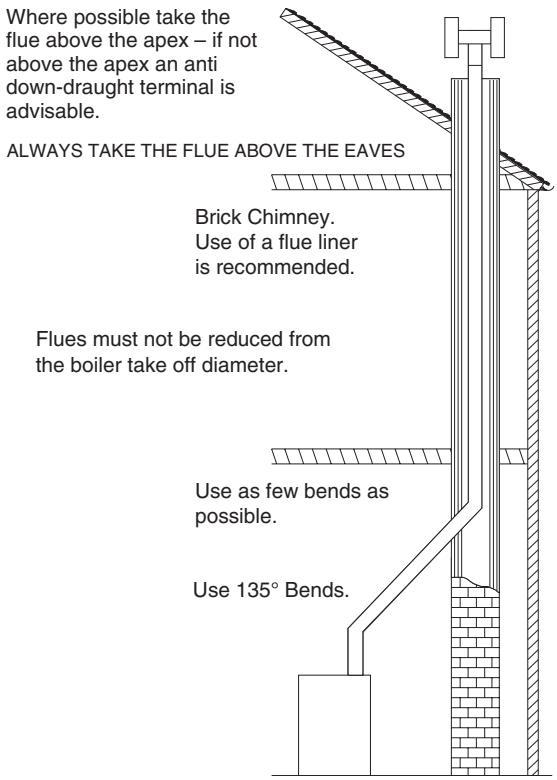

Where possible take the flue above the apex – if not above the apex an anti down-draught terminal is advisable.
ALWAYS TAKE THE FLUE ABOVE THE EAVES
Brick Chimney. Use of a flue liner is recommended.
Flues must not be reduced from the boiler take off diameter.
Use as few bends as possible.
Use 135° Bends.

Fig. 6. Flue Installation (Rear Discharge).

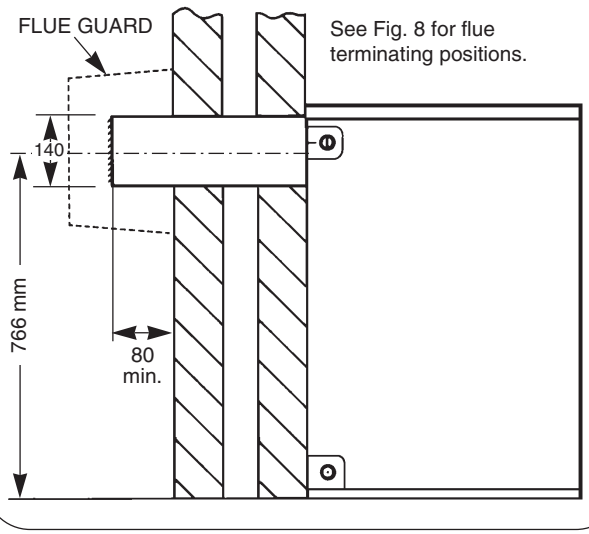
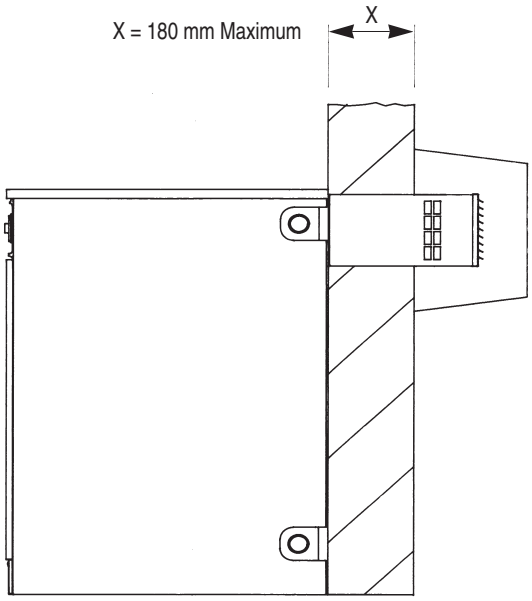
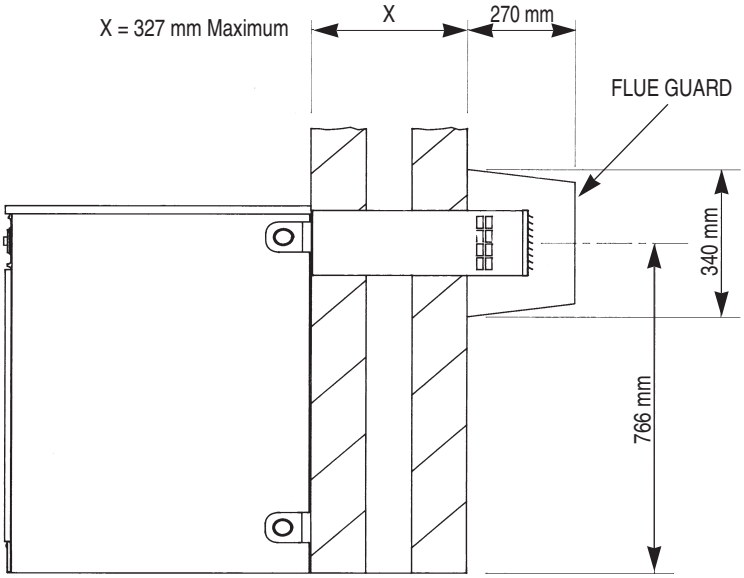


Fig. 7. Room Sealed Balanced Flue Terminal Installation.



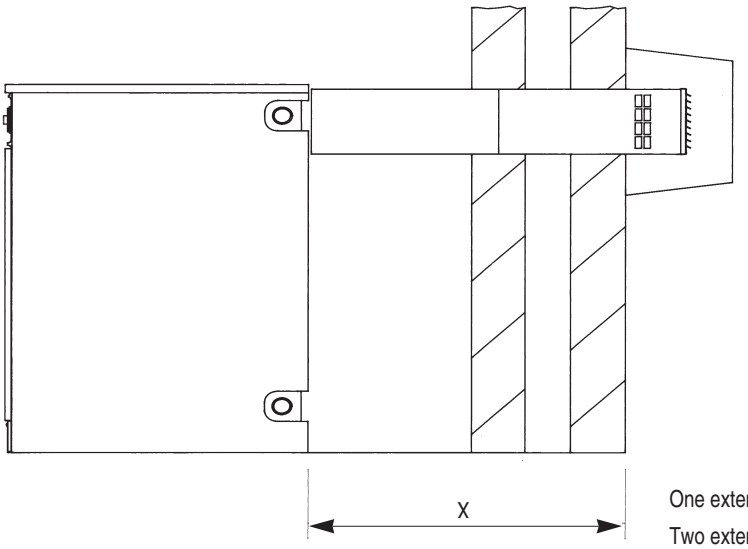
(a) Rear Discharge 4" to 7" Single Skin Wall.

For use with non-standard/single skin walls up to 182 mm thick.
Where noise emission from the flue terminal is likely to be of concern, it is recommended that the standard 12 in. terminal is used and the appliance stood away from the wall to take up the extra terminal body length.



(b) Rear Discharge 7" to 12" Wall.

For use in standard cavity walls and solid walls up to 327 mm thick. This terminal offers maximum noise reduction of the flue gases. This terminal is designed for use with the extension kit.



(c) Rear Discharge Extension Kit 12" to 36" Wall.

For use where the wall thickness exceeds 327 mm or where the appliance is to be stood away from the wall as shown. The system uses a standard 12 in. RS Flue Terminal and up to two extension kits, which simply bolt together.

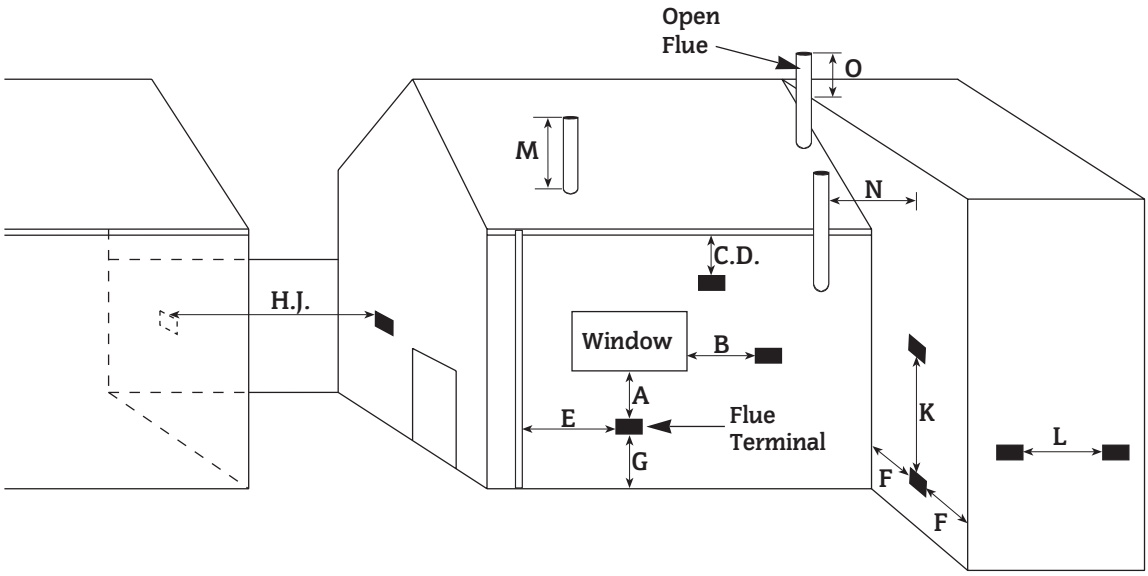
One extension kit – X = 638 mm Maximum
Two extension kits – X = 952 mm Maximum

Where bends are necessary, a maximum of two are permitted and 135° bends should be used.
All brick and masonry chimneys should be lined with a suitable non-combustible material. They must be properly jointed and able to withstand the effects of the working temperature of the appliance and any condensate which may form.
Down-draught conditions will adversely affect the operation of the appliance and must be avoided. Where possible, the flue should be extended beyond the apex of the roof and should always be taken beyond the eaves of the building. Where down-draught is experienced a suitable anti-down-draught terminal should be fitted to the flue termination.
The natural flue draught must be checked. A suitable location for checking this is located in the flue outlet plate on top of the boiler. The draught should be no less than 0.75mm w.g and no greater than 5.1mm w.g. If a flue draught greater than 5.1 mm w.g is experienced a draught stabiliser should be fitted to the flue and adjusted to achieve a flue draught within the specified range.

7.2 Low Level Discharge (LLD)
See Fig 6.
The conventional flue appliance may be converted to discharge the products of combustion at low level. For this purpose a special flue kit and associated ducting is available, allowing the conventional flue to be discarded. Detailed instructions for converting the appliance to low level discharge are supplied with the conversion kit. The flue spigot should be removed from the flue outlet plate by undoing the three retaining screws and the hole blanked off with the plate provided in the kit.
NOTE: Under no circumstances may 35 Second Gas Oil be burned with this type of flue terminal arrangement.
7.3 Room Sealed Balance Flue Model (RS)
The appliance is supplied ready for installation as a low level discharge balanced flue system by the simple addition of one of the flue terminal options shown in Fig.7.
Details of the installation procedure are included in the Flue Terminal Installation Instructions supplied with the terminal kit.
Alternatively, a range of room sealed balanced flue kits are available to convert the appliance to discharge the flue products to the left, right, at a higher level, or vertically up to a roof height of 4.5 metres.

Fig. 8. Flue terminating positions for oil-fired appliances

NOTE: The dimensions given are for general guidance only. Other surrounding buildings or objects may affect the clearance of combustion products. An alternative flue terminal position should be sought when there is any possibility of a nuisance being caused by inadequate dispersal of flue products.
Terminals should be positioned so as to avoid products of combustion entering into buildings.



Terminal Position		Minimum Distance (mm) Open Flue	Low-Level Discharge
A	Directly below an opening, air brick, window, etc.	Not allowed	600
B	Horizontally to an opening, air brick, window, etc.	Not allowed	600
C	Below a gutter or sanitary pipe	Not allowed	75
D	Below eaves or a balcony	Not allowed	600
E	From vertical sanitary pipework	Not allowed	75
F	From an internal or external corner	Not allowed	300
G	Above ground or balcony level	Not allowed	300
H	From a surface facing the terminal	Not allowed	600
J	From a terminal facing the terminal	Not allowed	1200
K	Vertically from a terminal on the same wall	Not allowed	1500
L	Horizontally from a terminal on the same wall	Not allowed	300
M	Above an intersection with the roof	600	Not applicable
N	From a vertical structure on the side of the terminal	600	Not applicable
O	Above a vertical structure less than 750 mm from the side of the terminal	600	Not applicable

7.4 Siting the flue terminal

1. The flue terminal must be located in a suitable position, as shown in Fig 8, such that products of combustion can be freely dispersed without the possibility of flue gases entering dwelling or that of a neighbouring dwelling.

2. Discharge of flue gases into carports or narrow passageways is not recommended.

3. The terminal must not cause obstruction nor the discharge cause a nuisance as a result of either flue gases or terminal noise.

4. If the terminal is fitted within 1 m of a plastic or painted gutter or within 500 mm of painted eaves then an aluminium or stainless steel shield at least 1 m long should be fitted to protect the surface.

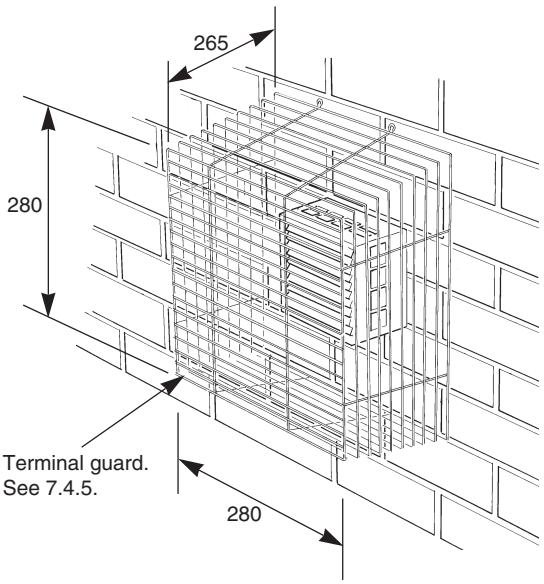
5. If a terminal is fitted less than 2 metres above a surface to which people have access, fit a terminal guard as shown in Fig 9. A suitable guard is available from Worcester Heat Systems, Part number 7 716 190 009, or alternatively a proprietary terminal guard may be used provided it has the minimum dimensions shown in Fig 9. The guard should have suitable corrosion resistance due to the acidic content of the flue gases.

6. The terminal guard must be evenly spaced about the flue terminal and secured using screws, to allow access to the flue terminal.

7. In certain weather conditions a terminal may steam and siting where this could cause a nuisance should be avoided .

8. Take care to ensure that combustion products do not enter ventilated roof voids.

Fig. 9. Terminal guard Minimum dimensions.



8. Oil Supply

(See Figs. 10, 11 and 12).

8.1 The oil storage tank must be installed in accordance with BS799: part 5. The tank should be arranged with a slope of 1 in 24 away from the outlet valve with a sludge cock at its lower end.

8.2 Do not use galvanised steel tanks or pipework for the oil supply system.

8.3 Do not use soldered joints in the oil supply pipework as this could cause a hazard in the case of a fire.

8.4 The burners on all appliances are supplied so as to be connected to a single pipe gravity feed system. Details of how to convert the burners to a double pipe sub-gravity feed system are shown in Fig. 10

8.5 If a single pipe system is employed, then the tank must be positioned such that the oil level does not exceed 4 metres above the level of the burner oil pump and in addition the oil level must be at least 0.3 metres above the level of the oil pump. Should it prove impossible to site the tank below the 4 metres maximum oil level head breaking device must be installed between the tank and the burner.

8.6 If a double pipe system is used then the maximum suction height allowable is 3.5 metres.

8.7 The oil supply pipe diameter can be determined using Tables 9 and 10 depending on whether a single or double pipe system is being installed. Selection of the correct pipe diameter will depend on the position of the oil storage tank relative to the burner and the length of pipe run.

8.8 The oil supply pipe should be laid as level as possible to avoid air pockets and unnecessary friction losses.

8.9 The following components should be fitted in the fuel line between the storage tank and burner.

1. A Manual isolating valve installed as close to the tank as possible.

2. A fire valve in accordance with BS799, Part 2 as shown in Fig 11. The fire valve should be fitted externally with a fire detection element located within the appliance case. Use of a capillary type valve will allow a neat and simple installation. A suitable valve is the KBB manufactured by Teddington Controls Limited. A spring clip has been provided behind the electrical panel on CF/LLD models, shown in Fig 3, and on the burner box on RS models, shown in Fig 4, to allow a fire valve element to be mounted. Alternatively a fusible link or electrical system may be used. Under no circumstances should a combination isolating/fire valve be used as the sole fire protection device.

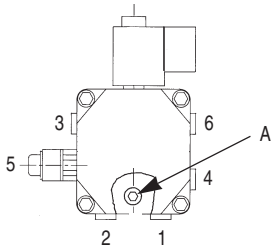
3. A paper element filter complying with the requirements of BS799, Parts 2, 3 and 4 should be fitted in the fuel line between the fire valve and the isolating valve but not within the appliance casing.

TABLE 9 Single Pipe Gravity Feed System

HEAD (metres)	MAXIMUM ALLOWABLE PIPE RUN (metres)	
	8 mm inside dia. pipe (10 mm O.D. copper)	10 mm inside dia. pipe (12 mm O.D. copper)
0.5	10	20
1.0	20	40
1.5	40	80
2.0	60	100

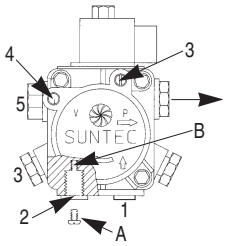
Fig. 10. Oil Pump.

A. Danfoss BFP 11 Oil Pump.



To convert to a double pipe system: Remove the pump front cover, remove the changeover screw (A) nearest to ports 1 and 2, and the horseshoe washer underneath. Replace the changeover screw back into the threaded hole. Connect the flow and return pipes to 1 and 2.
Note: When removing the pump front cover ensure that a suitable receptacle is placed below the pump to catch the oil residue.

B. Suntec AS47C-K Oil Pump.



To convert to a double pipe system, remove the return port plug (2) and insert the grub screw (A) provided into the threaded hole (B). Connect flow and return pipes to (1) and (2).

TABLE 10 Double Pipe Sub-Gravity Feed System

HEAD (metres)	MAXIMUM ALLOWABLE PIPE RUN (metres)	
	8 mm inside dia. pipe (10 mm O.D. copper)	10 mm inside dia. pipe (12 mm O.D. copper)
0	35	100
0.5	30	100
1.0	25	100
1.5	20	85
2.0	15	70
2.5	11	50
3.0	8	30
3.5	6	20

Fig. 11. Oil Supply.

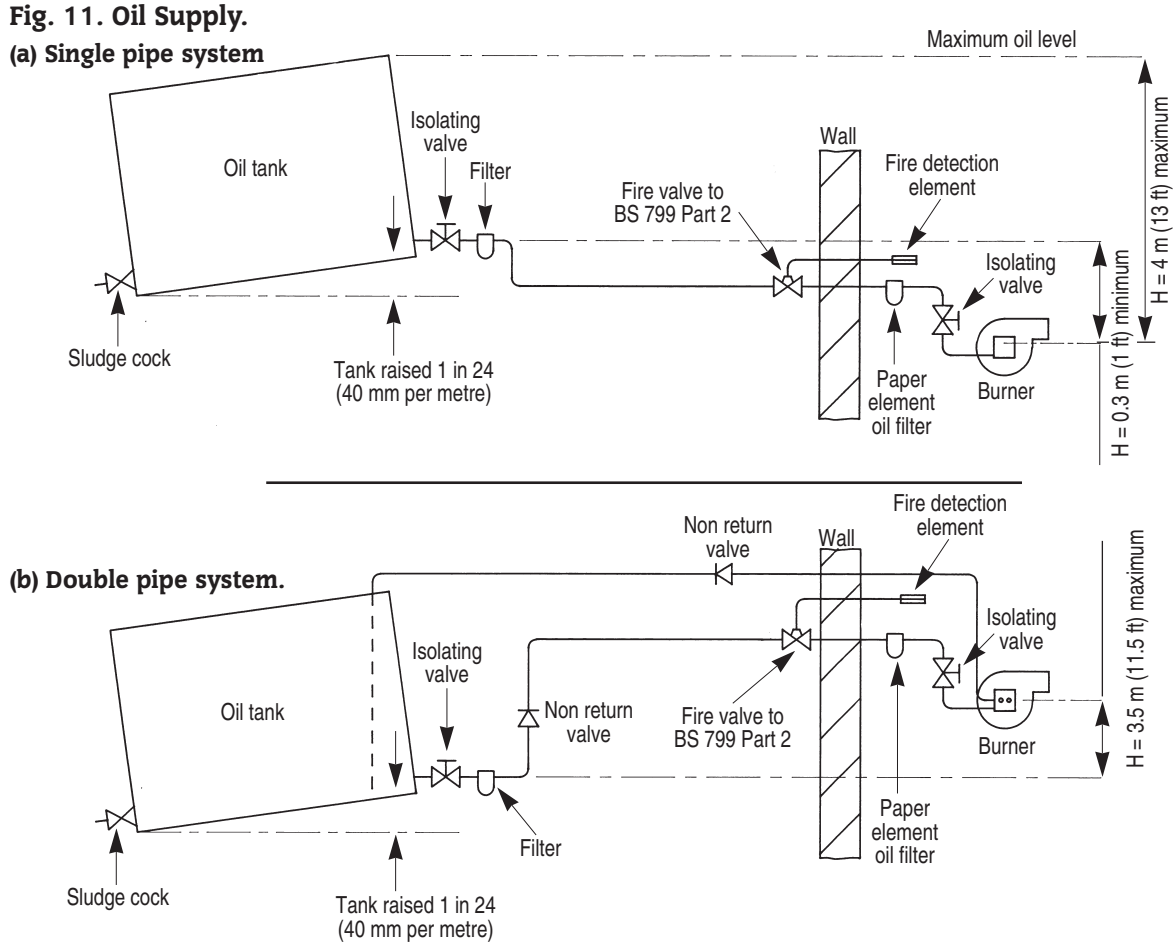
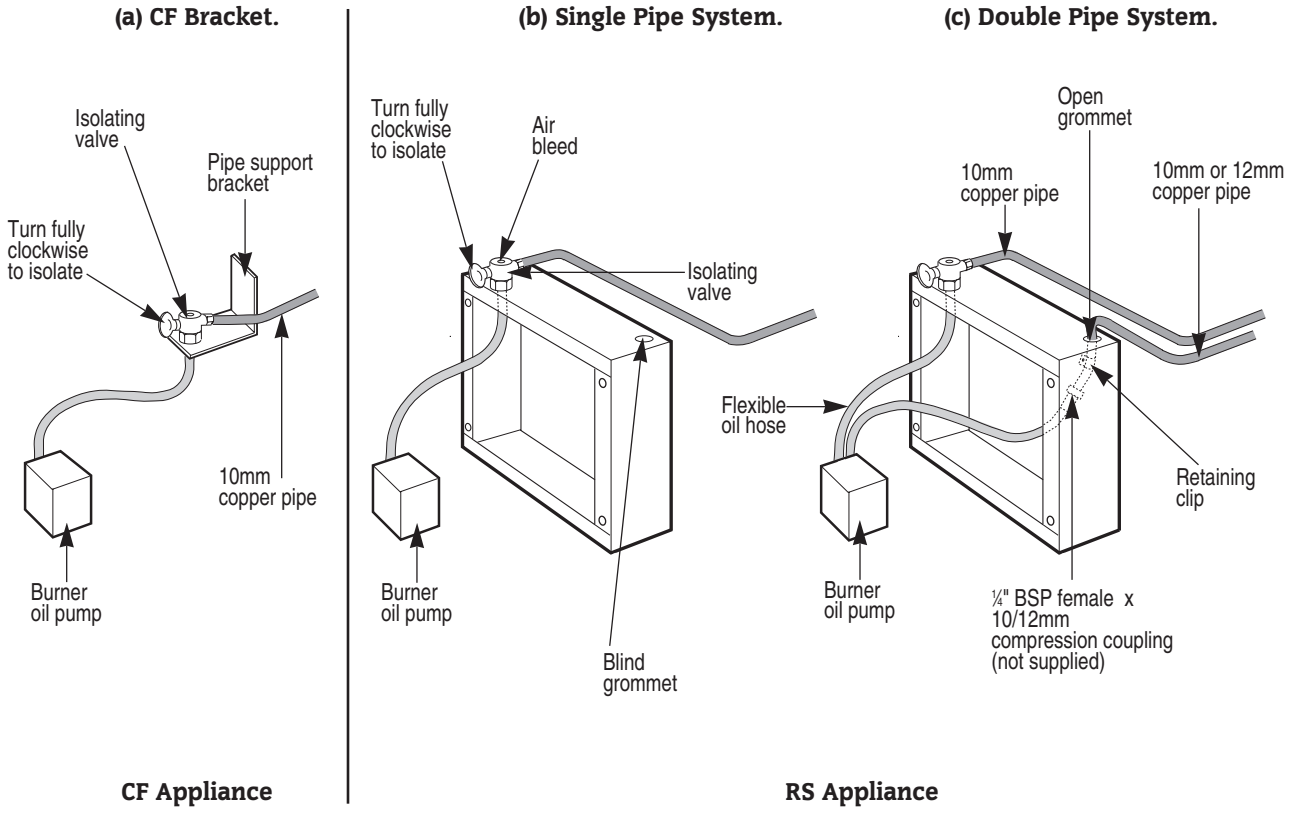


Fig. 12. Oil Pipe Installation.



9. System Considerations

9.1 The appliance incorporates a circulating pump. No other pump is required. The appliance will operate satisfactorily on a two-pipe small bore or micro bore system using thermostatically controlled radiator valves.
9.2 The appliance incorporates a three-port, two-way diverter valve which diverts the boiler output to the Heatslave tank in response to a demand from the Domestic Hot Water Control Thermostat or the Flow Switch. The valve is powered open in response to a demand from the Central Heating Control Thermostat or a Room Thermostat, and the boiler output is diverted to the heating circuit.
If there is a demand from both the Heatslave tank and the central heating, the valve will give priority to the Heatslave tank. The central heating will therefore remain switched off for a short period of time. This delay will vary depending on the appliance output and the quantity of energy required to satisfy the domestic hot water demand.
The Heatslave tank priority can be temporarily overridden to regain the central heating output by turning the Domestic Hot Water Thermostat fully anti-clockwise for the duration of the warm up period. This will prevent the Heatslave tank taking priority for the tank warm up period of approximately 20 minutes and may be found advantageous to give quicker heating to the dwelling when starting from cold.
9.3 A check valve is incorporated in the hot water primary circuit to prevent gravity circulation from the tank to the boiler.
9.4 When employing a central heating system where primary water flow may be prevented during a pump overrun situation (e.g. by using thermostatic radiator valves on all radiators), a bypass valve should be fitted between the flow and return pipes.
9.5 The pressure jet burner fitted to the appliance has full automatic control and there is no requirement for heat leak radiators.
9.6 It is strongly recommended that isolating valves are fitted to the central heating flow and return pipes. This will allow the boiler and Heatslave tank to be drained for service work without having to drain down the whole central heating circuit.
9.7 A drain point should be provided in the domestic hot water pipework at any point below the height of the domestic hot water heat exchanger.
9.8 Provision should be made to allow air to be vented from the domestic hot water pipework at any high points. Failure to vent the air will cause the flow switch to operate momentarily if a cold water tap is turned off rapidly.
9.9 Any unused boiler tappings should be plugged prior to filling.
9.10 The primary central heating system should be flushed and treated in accordance with recommendations of BS 7593: 1992 before the system is handed over to the user.

10. Sealed Primary System

See Figs. 13 and 14.
10.1 The system must comply with the requirements of BS 7074:1 and BS 5449:1.
10.2 A manual reset overheat thermostat is located on the underside of the electrical panel and is accessible by removing the cabinet front panel. If a boiler overheat condition arises the burner will remain inoperative until the thermostat button is reset. See Fig. 3 and 4.
10.3 The pressure relief valve operates at 3 bar (45 lb/in^2). The discharge must be directed away from the electrical components or where it might be a hazard to the user.
10.4 The pressure gauge, located in the pipe below the pump, indicates the system pressure which must be maintained.
10.5 The 12 litre expansion vessel is charged to 0.5 bar and is suitable for a static head of 5 metres (17.5 ft). The pressure can be increased for a static head greater than 5 metres (17.5 ft).
10.6 With an initial system pressure of 0.5 bar, a system capacity of about 180 litres can be accommodated. Refer to BS 7074 Pt 1 for more information.

Fig. 13. Sealed Primary System.

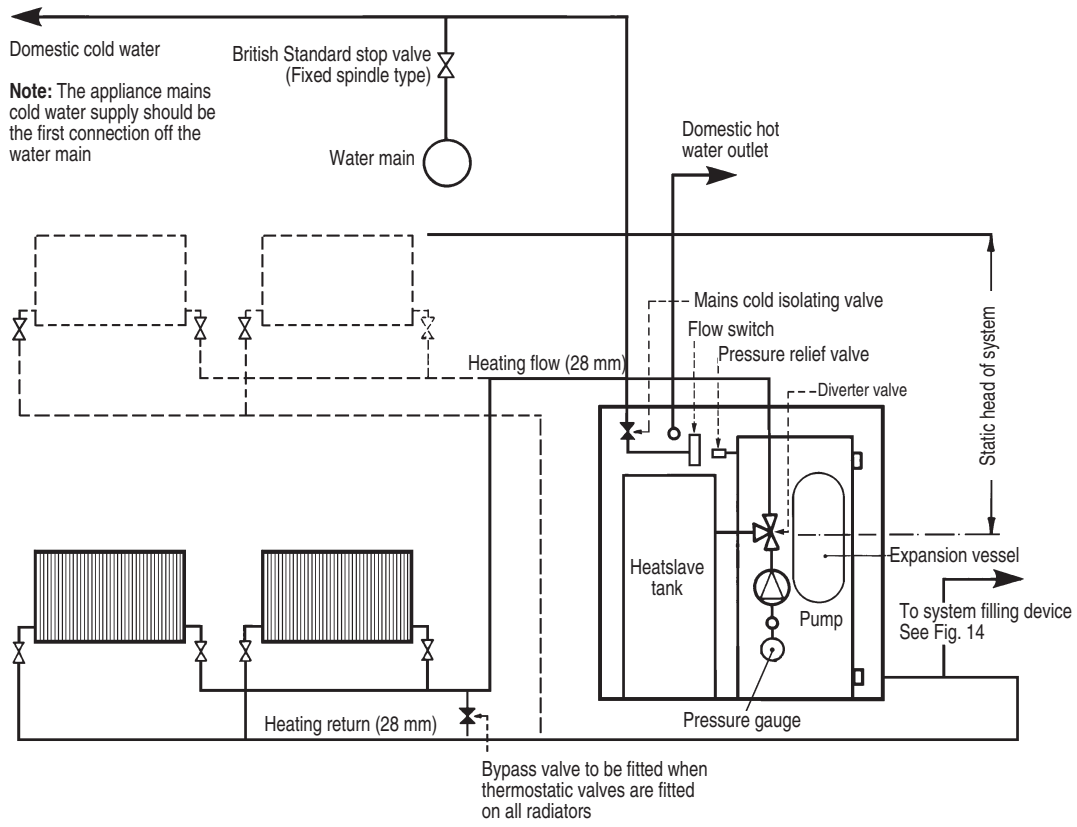
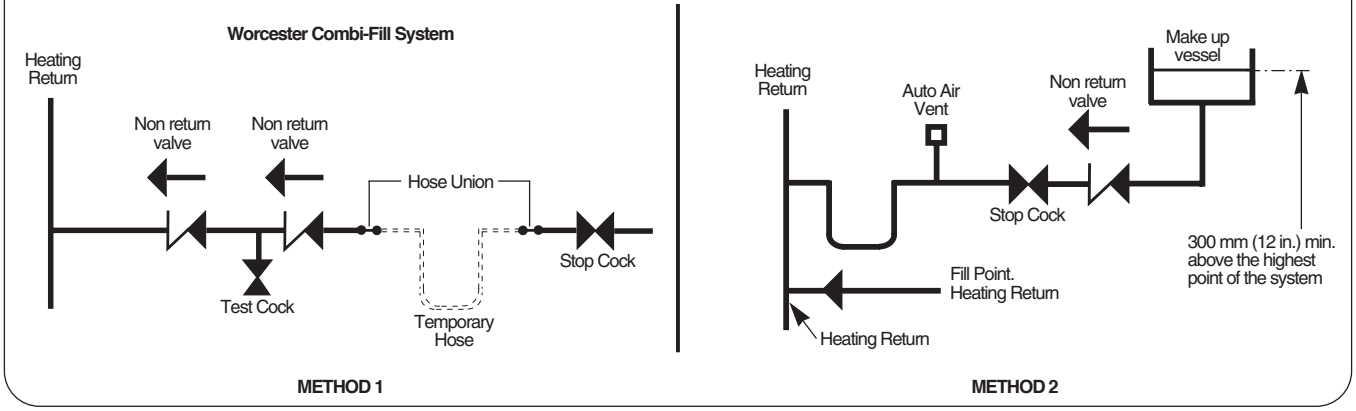

Domestic cold water
Note: The appliance mains cold water supply should be the first connection off the water main
British Standard stop valve (Fixed spindle type)
Water main
Domestic hot water outlet
Mains cold isolating valve
Flow switch
Pressure relief valve
Heating flow (28 mm)
Diverter valve
Static head of system
Heatslave tank
Expansion vessel
Pump
To system filling device See Fig. 14
Heating return (28 mm)
Pressure gauge
Bypass valve to be fitted when thermostatic valves are fitted on all radiators

Fig. 14. System Filling and Make-Up.

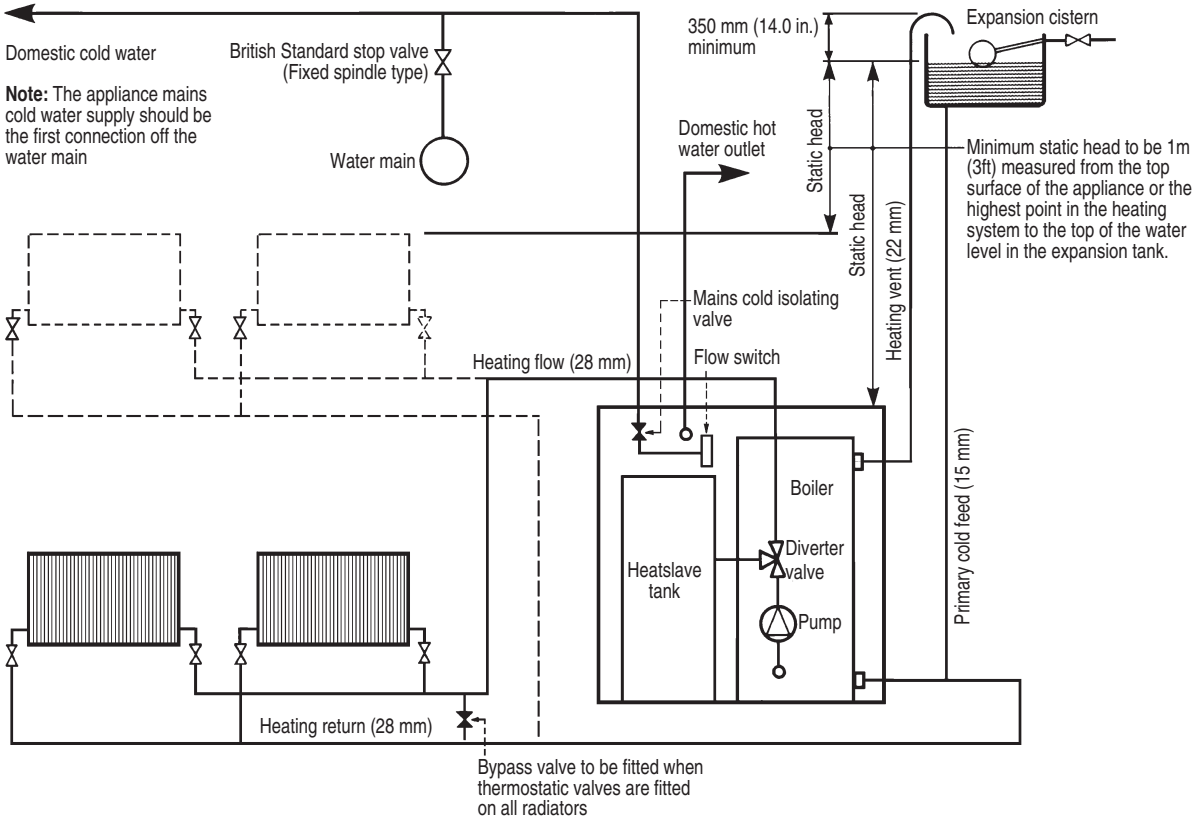


Where the system volume exceeds the value given in Table 11 an additional expansion vessel, of suitable volume, should be fitted to the heating return pipework as close to the boiler as possible.
NOTE: The values given in Table 11 are the total system volumes. The primary water capacity given in Table 1 should be deducted from the total system volume when calculating the volume for radiators, pipework etc.
10.7 The method of filling the appliance can be either method 1 or 2 shown in Fig 14. The filling point must be at low level and must never be a permanent direct fixing to the mains water supply.
10.8 Water loss must be replaced, see Fig 14. The connection should be made to the central heating return pipe as close to the appliance as possible.
10.9 The make-up vessel, where used, must be fitted with a non-return valve.
10.10 Repeated venting loses water from the system. It is essential that this water is replaced and the system pressure maintained.
10.11 Connections to the mains water supply must not be made without the authority of the local Water Company.
10.12 The appliance incorporates a circulating pump. No other circulating pump is required. The pump is factory set to the maximum setting (No: 3) and should not be altered as this would affect the domestic hot water performance.
10.13 Connections in the system must resist a pressure of up to 3 bar.
10.14 Radiator valves must conform to BS 2767 (10): 1972.
10.15 Other valves used should conform to the requirements of BS 1010.

11. Open Vent Primary System

See Fig 15.
The appliance is supplied ready for connection to a Sealed Water system. Where the appliance is to be used with an Open Vent System, the pressure relief valve may be removed and the tapping blanked off. If the relief valve is left in position, a discharge pipe should be fitted. The pipe must be directed away from the electrical components or where it might be a hazard to the user.

Fig. 15. Open Vent Primary System.


Domestic cold water
British Standard stop valve (Fixed spindle type)
Note: The appliance mains cold water supply should be the first connection off the water main
Water main
350 mm (14.0 in.) minimum
Expansion cistern
Domestic hot water outlet
Static head
Minimum static head to be 1m (3ft) measured from the top surface of the appliance or the highest point in the heating system to the top of the water level in the expansion tank.
Static head
Heating vent (22 mm)
Mains cold isolating valve
Flow switch
Heating flow (28 mm)
Boiler
Heatslave tank
Diverter valve
Pump
Primary cold feed (15 mm)
Heating return (28 mm)
Bypass valve to be fitted when thermostatic valves are fitted on all radiators

The following points are for guidance only. The system installation should be carried out in accordance with BS 5449. Part 1.

11.1 The feed and expansion pipes must rise continuously from the appliance. The feed pipe must be at least 15mm diameter and the expansion pipe must be at least 22mm diameter. If access to the 1¼" BSP sockets on the right hand side of the boiler is difficult, use the alternative return connection on the boiler pipework. See Figs. 3 and 4.

The cistern must be arranged to provide a minimum static head of 1 metre (3 ft) above the top of the appliance casing or the highest point in the heating circuit. See Fig 15.

11.2 Air in the appliance is expelled through the vent pipe or dissipated into the system, but manual air vents should be fitted at high points in the system. An automatic air vent is fitted to the Heatslave tank and manual air vents are included on high points in the appliance pipework.

11.3 The appliance incorporates a circulating pump. No other circulating pump is required. The pump is factory set to the maximum setting (No: 3) and should not be altered as this would affect the domestic hot water performance.

TABLE 11

TOTAL SYSTEM VOLUME (Litres)			
Initial System Pressure (bar)	Initial Charge Pressure (bar)		
	0.5	1.0	1.5
0.5	180	–	–
1.0	107	138	

12. Domestic Hot Water

The following are general requirements and, if necessary, reference should be made to the local Water Company before fitting the appliance.

12.1 Mains Cold Water Inlet

Devices capable of preventing the flow of expansion water must not be fitted unless separate arrangements have been made. An expansion vessel can be fitted within the casing of the appliance if necessary.

The final 600mm of the mains cold water connection to the appliance should be made in copper tube only.

The appliance is suitable for a mains cold water supply having a maximum pressure of up to 10 bar (145 lb/in^2). A pressure reducing valve must be fitted if the mains pressure exceeds 10 bar.

12.2 Domestic Hot Water Supply and Flow Regulation

As with all mains fed systems, the flow rate of water obtainable from individual taps will vary in relation to the number of outlets operated simultaneously.

The flow rate will depend on the cold mains supply pressure available to the property and the diameter and length of pipework making up the domestic water distribution system.

When more than one outlet is used at once, starvation of water flow may occur at one or more outlets. Where this is a problem flow balancing valves or Ball-O-Fix valves should be installed at the appropriate outlets.

The 26/32 appliance is not fitted with a flow restrictor and therefore the flow rate is only limited by the water supply pressure. This can be manually adjusted at the mains cold water inlet isolating valve. The maximum recommended domestic hot water flow rate from this appliance is 22 litres/min (4.8 gallons/min).

The temperature of hot water drawn will vary with the flow rate at the taps and the appliance operating temperatures. It is usual that flow rates (and thus temperatures) are controlled at the tap, but if a more permanent setting is required, a mixing valve can be fitted.

If there are long pipe runs to the taps or shower, it is suggested that they be insulated to prevent the rapid cooling of residual hot water in the pipes after the tap has been turned off.

12.3 Taps and Valves

Hot and cold taps and mixing valves used with this appliance must be suitable for operating at a mains pressure of up to 10 bar (145 lb/in^2).

12.4 Showers (Fixed Head Type)

No anti-syphonage arrangements are necessary. Thermostatically controlled shower valves will give extra comfort and guard against the flow of water at too high a temperature.

12.5 Showers (Loose or Flexible Head Type)

A loose head shower hose must be fixed so that the head cannot fall closer than 25mm (1 in) above the top edge of the bath to prevent its immersion in bath water. Alternatively the shower must incorporate or be fitted with an anti-syphonage device at the point of the flexible hose connections.

Thermostatically controlled shower valves will give extra comfort and guard against the flow of water at too high a temperature.

12.6 Bidets

The supply of hot and cold mains water direct to a bidet is permitted (subject to local Water Company requirements) provided that the bidet is of the over-rim flushing type. The outlet(s) should be shrouded and unable to have any temporary hand held spray attached. No anti-syphonage arrangements are necessary.

12.7 Use in Hard Water Areas

In areas of exceptionally hard water supply, it is recommended that an In-line scale inhibitor be fitted.

Installation should be strictly in accordance with the requirements of the local Water Company. An isolating valve to facilitate servicing should be incorporated.

The water hardness may be determined using the standard test paper or by reference to the local Water Company.

Further information may be obtained from Worcester Heat Systems Ltd.

13. Electrical

Refer to Figs. 16, 17, 18 and 19.

13.1 The wiring between the appliance and the electrical supply shall comply with current IEE Wiring Regulations and any local regulations which apply.

13.2 To gain access to the mains connection point on the control board.

1. Isolate the mains electrical supply.

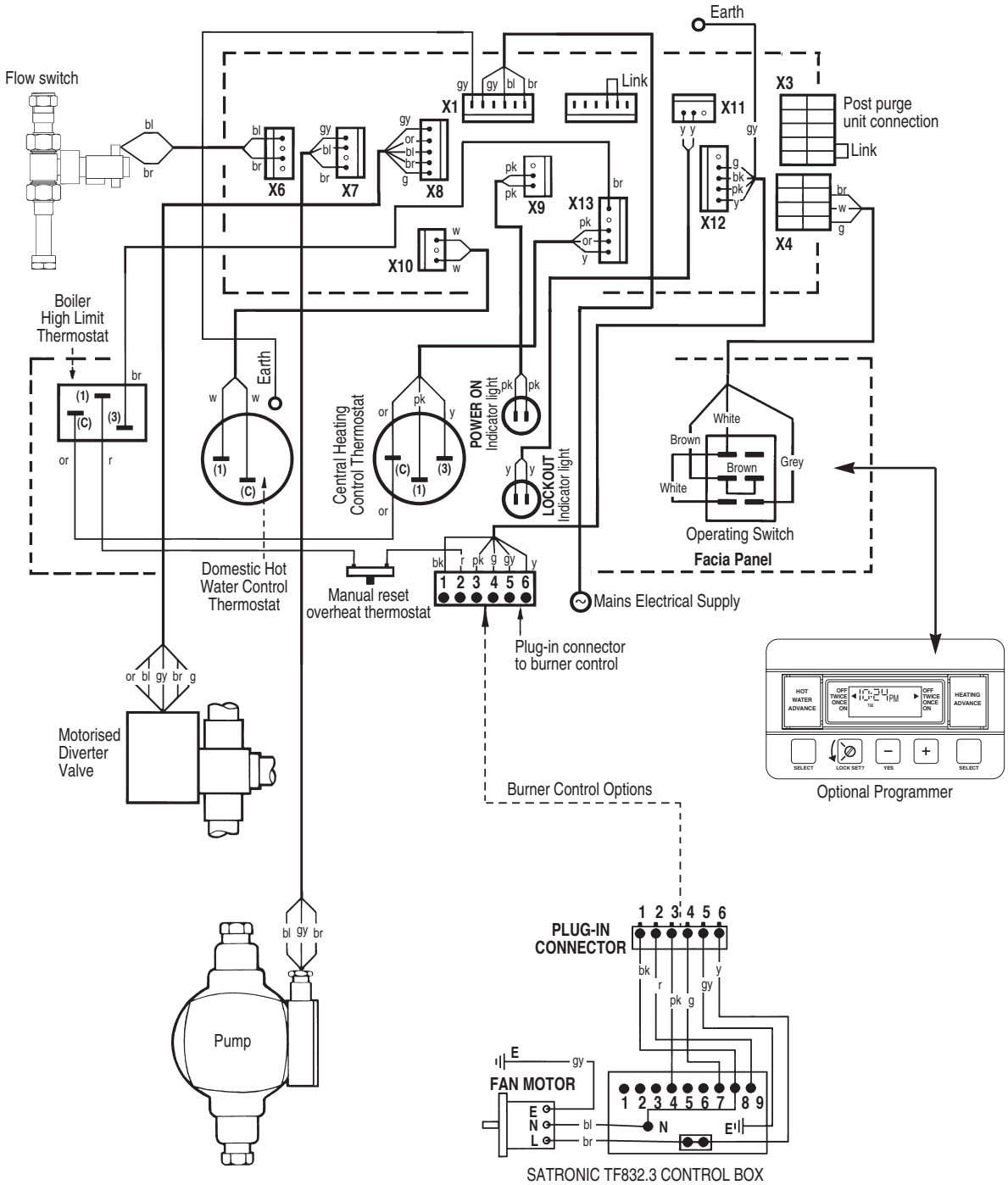
2. Remove the cabinet top panel by snatching squarely upwards.

3. Release the four screws securing the cover of the electrical control box.

13.3 Mains Supply

Mains Supply-230/240V ~ 50 Hz.
External Fuse 5A. Internal Fuse 3.15A (20 mm). Quick Blow.
LIVE-Brown, NEUTRAL-Blue, EARTH-Green/Yellow
Mains Cable: 0.75mm² (24 x 0.20mm) to BS6500 Table 16.
The method of connection to the appliance must allow complete isolation of the appliance, preferably via a double pole isolator with a contact separation of 3mm in all poles supplying the boiler and controls only.

Fig. 16. Wiring Diagram.



COLOUR CODE
br – brown bl – blue gy – green and yellow
r – red w – white y – yellow g – grey
bk – black or – orange pk – pink

Fig. 17. Schematic Electrical Diagram.

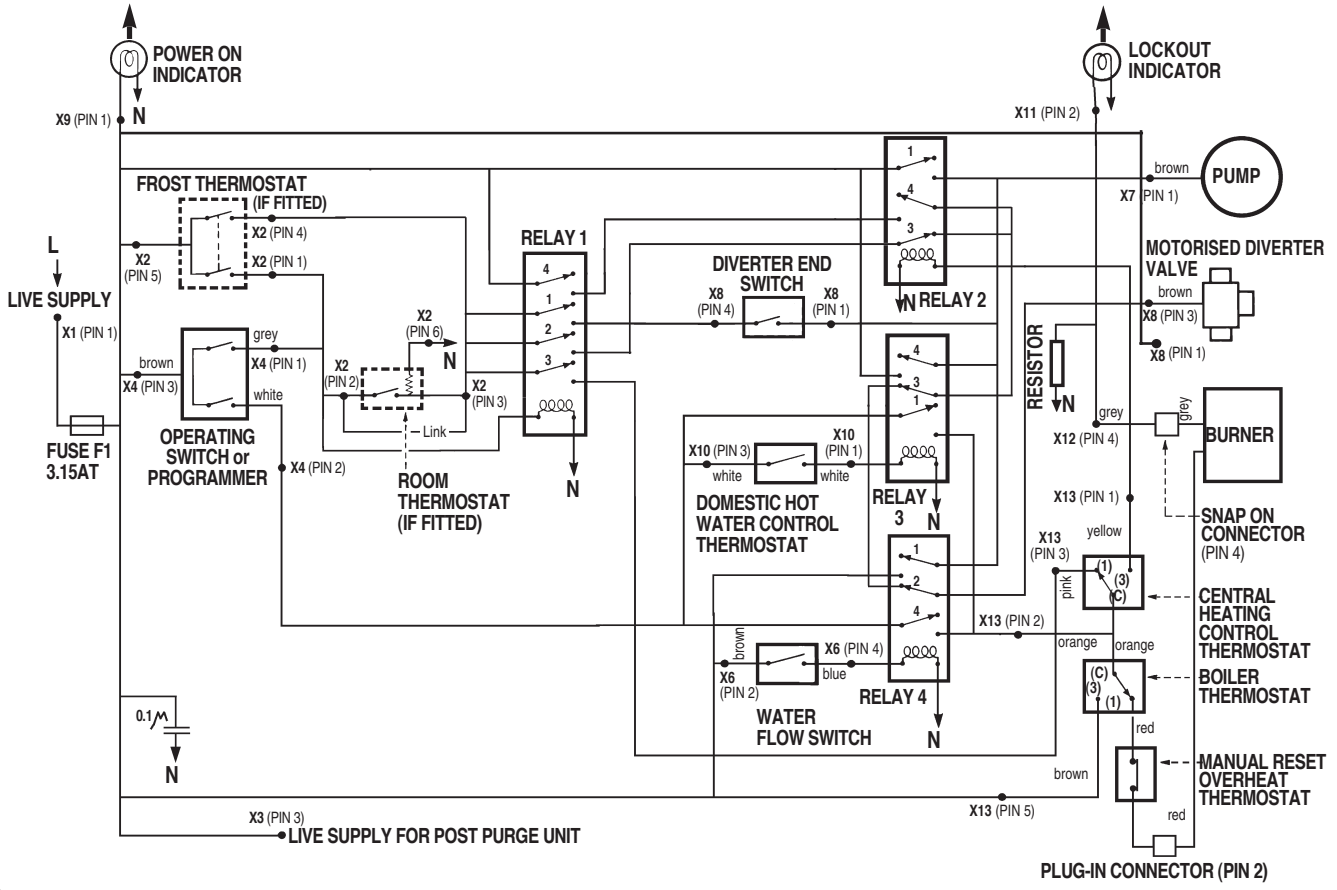


Fig. 18. Room and Frost Thermostat Connections

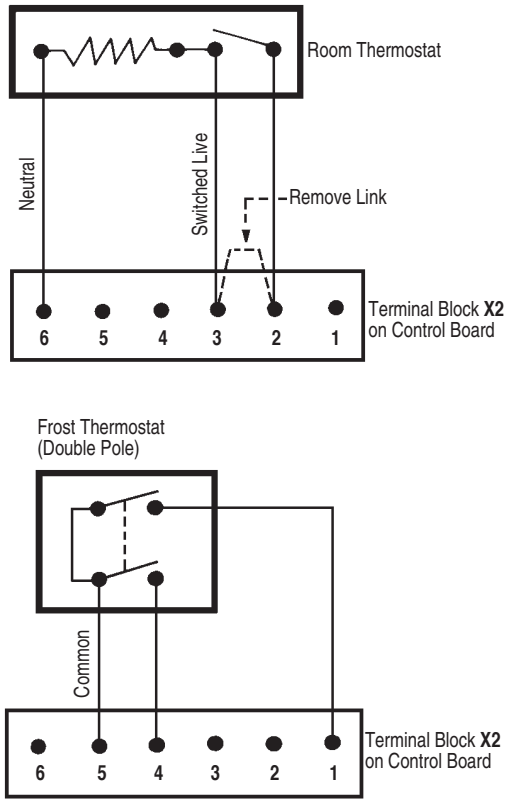


Fig. 19a. Facia Mounted Programmer Connections.

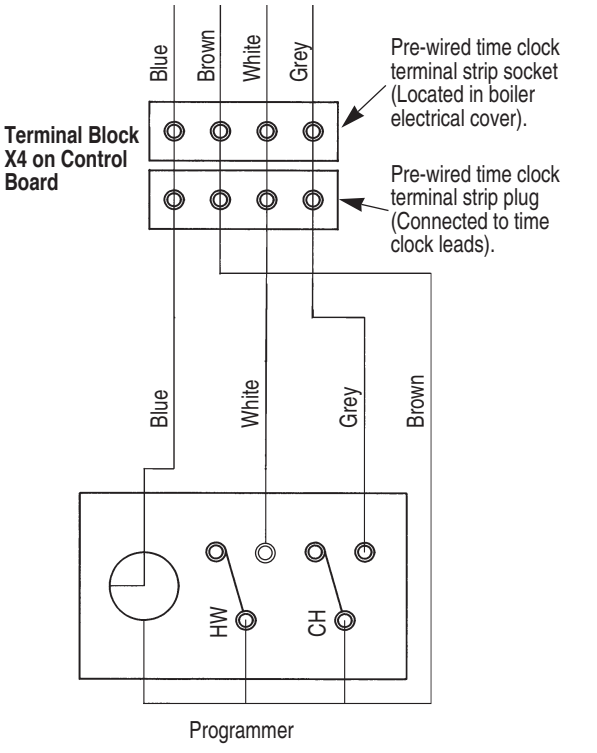
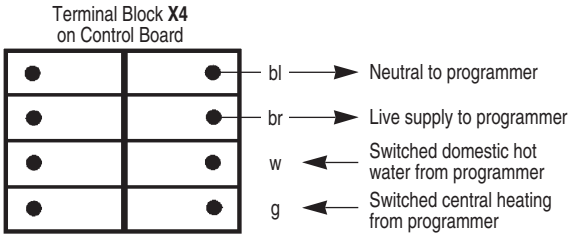


Fig. 19b. External Programmer Connections.



The mains supply cable should be connected into the mains connection points on the control board marked L (Live), N (Neutral) and E (Earth) on the control board and securely held in the cable clamp located on the base of the electrical box. To secure the cable, remove the clamp retaining screw and pull its inner body out to allow the cable to be fed through. With the cable in position refit the screw and fully tighten to grip the cable. Feed the cable between the side panel and the boiler insulation jacket and route to the connection point avoiding any hot surfaces.
The appliance must be earthed.

13.4 Facia Mounted Programmer
(See Fig. 19a)
A plug in, colour co-ordinated, 2 channel electronic programmer is available from Worcester Heat Systems. The programmer will give fully independent central heating (CH) and hot water (HW) programmes when the switch on the rear of the unit is set to P. Full instructions covering installation and operation of the programmer are included with the kit.

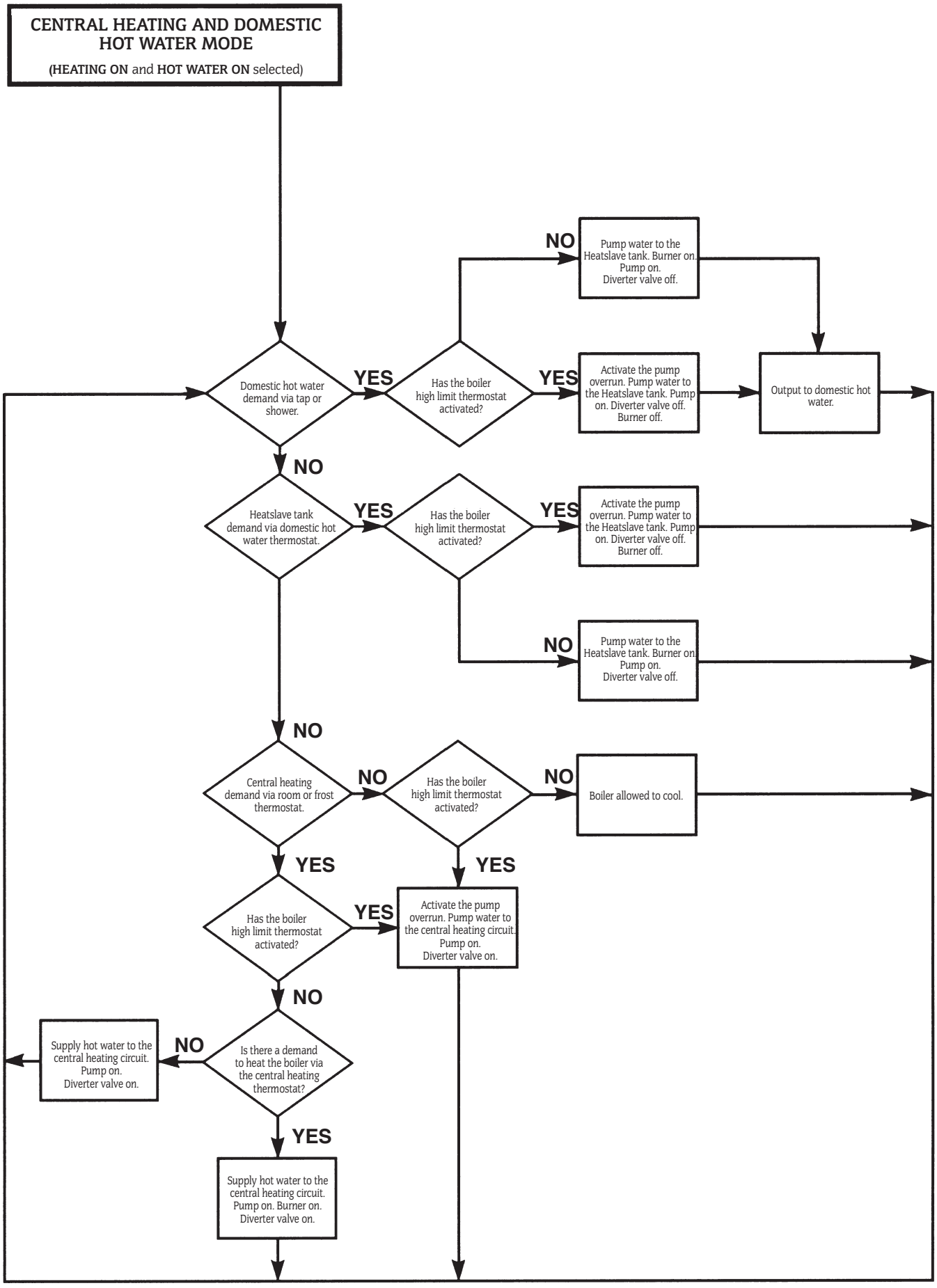
13.5 External Programmer
(See Fig. 19b)
A programmer offering time controlled central heating and domestic hot water or one which provides controlled central heating and switched domestic hot water is acceptable.

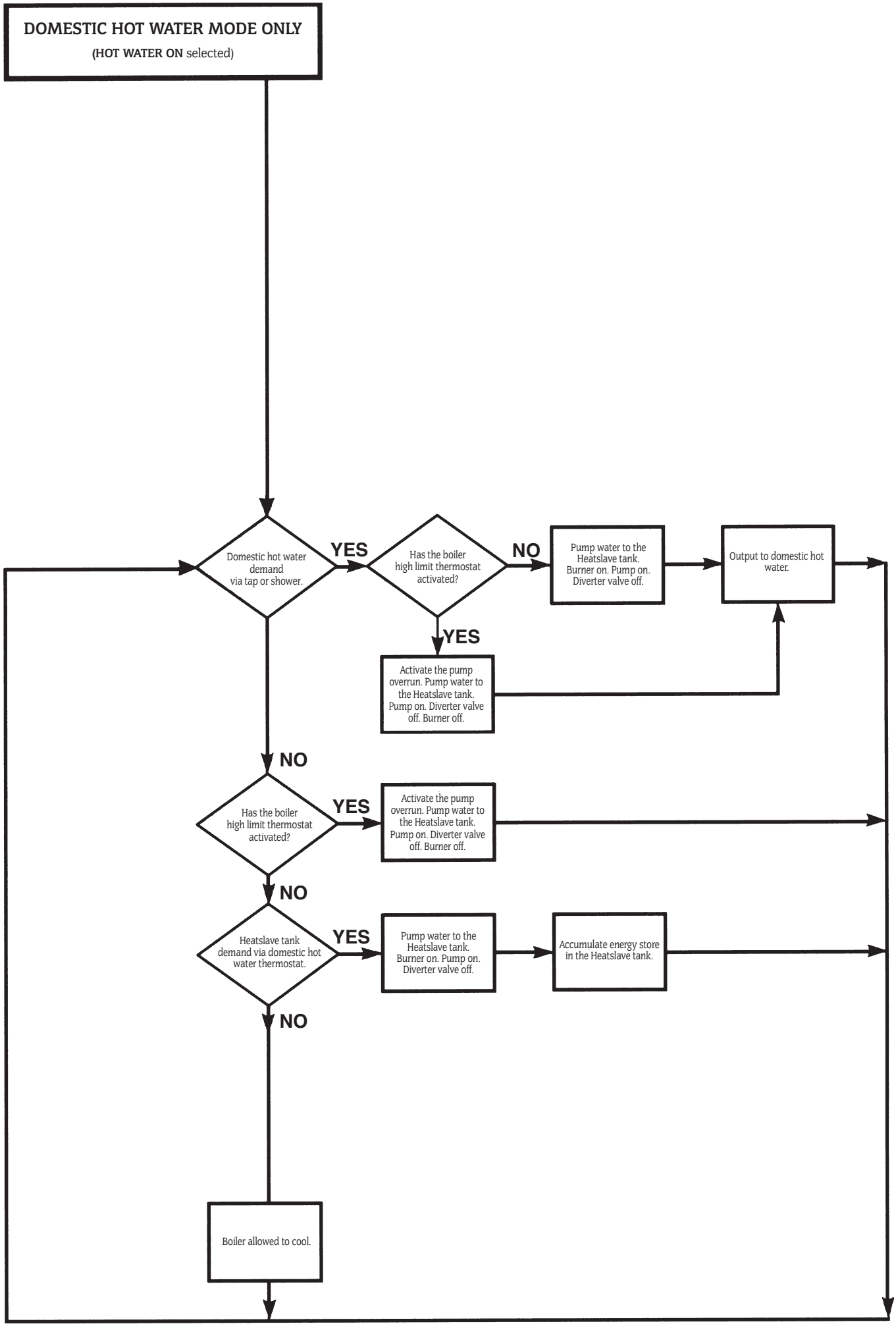
Fitting an external programmer:
Check that the electrical supply has been turned off and remove the facia panel as described in Section 19.2 (15).
The external programmer must take its power supply from the appliance. See Fig 19b. The leads must be insulated as they operate at mains voltage.
Pass the leads through the hole provided in the electrical box back panel and connect them to terminal block **X4** to which the leads from the facia mounted switch are currently still connected. See Fig. 19b.
Disconnect the grey lead from the terminal block and connect, in its place, the central heating control lead from the programmer.
Disconnect the white lead from the terminal block and connect, in its place, the domestic hot water control lead from the programmer.
Disconnect the brown lead from the terminal block and connect, in its place, a brown lead (live supply) to the programmer.
The remaining connection in the block is the neutral connection for the programmer.
Where an earth point is provided on the programmer then this should be wired to the appliance control box earth point on the **X1** terminal block.
Although inoperative, the facia mounted switch should be left in place. Remove the spade connectors from the user operating switch and discard the wires removed.
Refit the facia and set the programmer.
Check the operation of the appliance in response to the switching of the programmer.

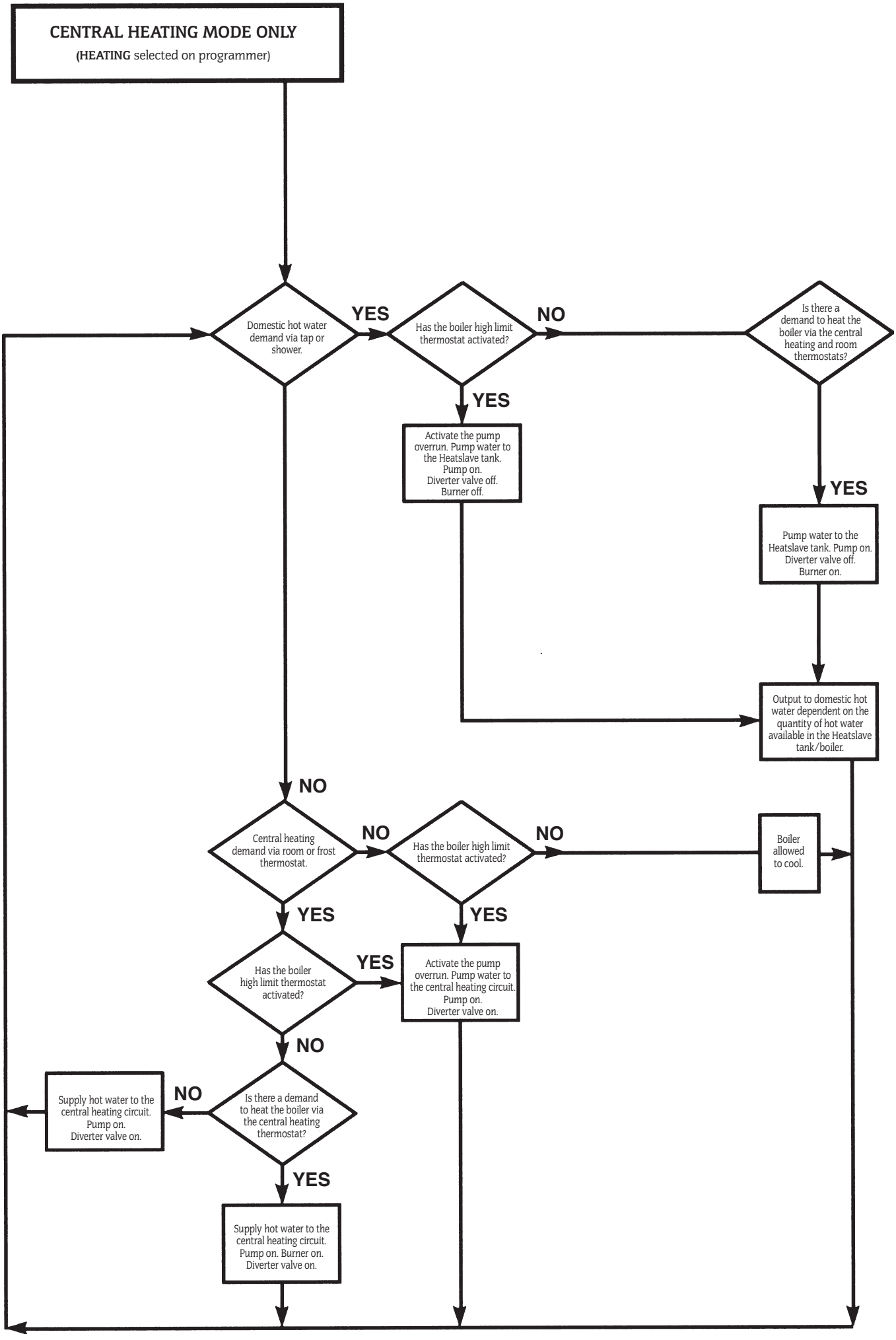
13.6 External Thermostats
If a room and/or frost thermostat is to be fitted, refer to Fig 18. The thermostats must be suitable for use on mains voltage.
An optional earth point is provided on the **X1** terminal block if required.

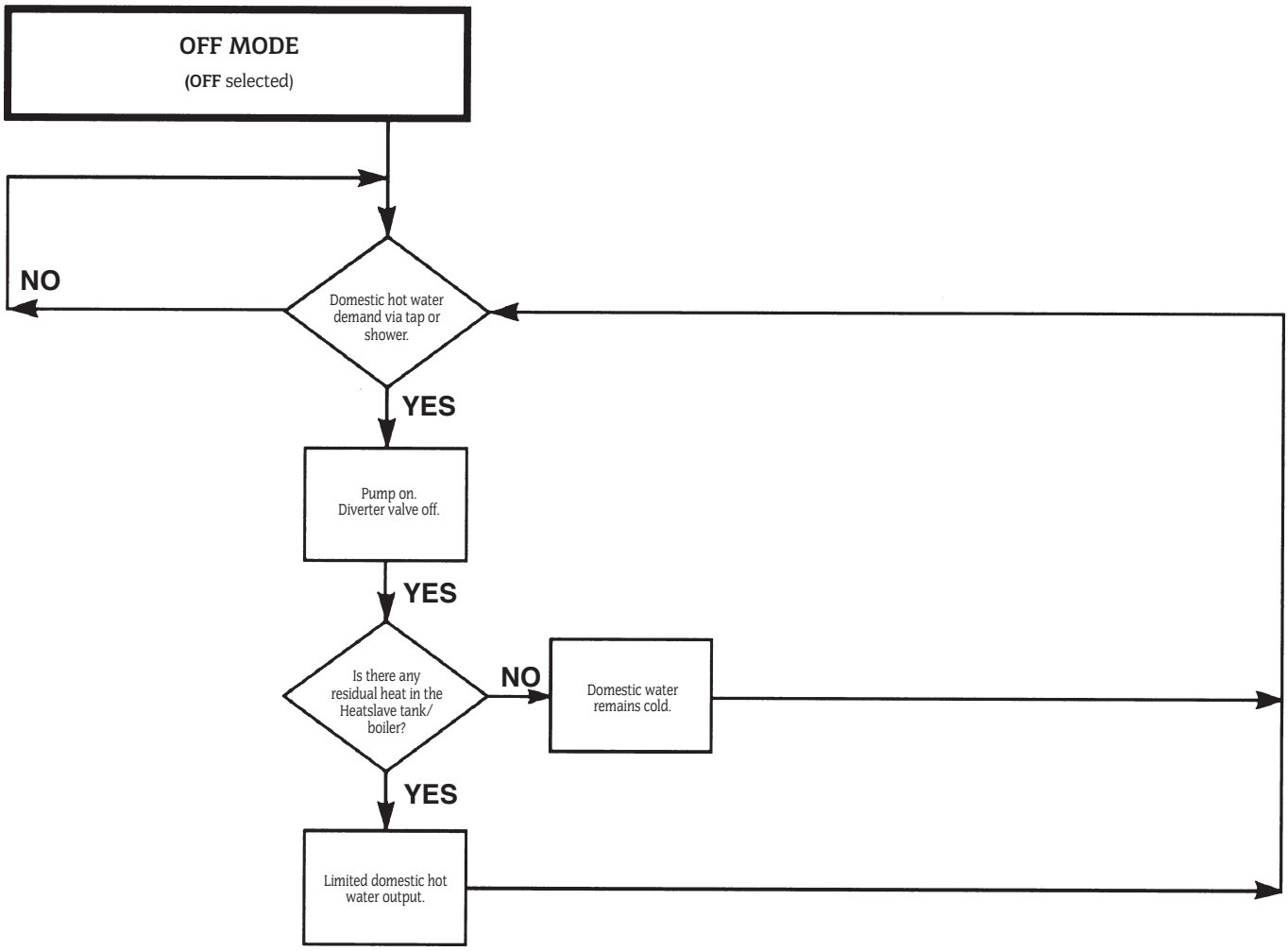
13.7 Safety Check
In the event of an electrical fault after the installation of the appliance, the electrical system shall be checked for short circuits, fuse failure or incorrect polarity of connections.

14. Functional Flow Chart


CENTRAL HEATING AND DOMESTIC HOT WATER MODE
(HEATING ON and HOT WATER ON selected)
Domestic hot water demand via tap or shower.
YES
Has the boiler high limit thermostat activated?
YES
NO
Pump water to the Heatslave tank. Burner on. Pump on. Diverter valve off.
Activate the pump overrun. Pump water to the Heatslave tank. Pump on. Diverter valve off. Burner off.
Output to domestic hot water.
NO
Heatslave tank demand via domestic hot water thermostat.
YES
Has the boiler high limit thermostat activated?
YES
Activate the pump overrun. Pump water to the Heatslave tank. Pump on. Diverter valve off. Burner off.
NO
Pump water to the Heatslave tank. Burner on Pump on. Diverter valve off.
NO
Central heating demand via room or frost thermostat.
NO
Has the boiler high limit thermostat activated?
NO
Boiler allowed to cool.
YES
YES
Has the boiler high limit thermostat activated?
YES
Activate the pump overrun. Pump water to the central heating circuit. Pump on. Diverter valve on.
NO
Is there a demand to heat the boiler via the central heating thermostat?
NO
Supply hot water to the central heating circuit. Pump on. Diverter valve on.
YES
Supply hot water to the central heating circuit. Pump on. Burner on. Diverter valve on.


DOMESTIC HOT WATER MODE ONLY
(HOT WATER ON selected)
Domestic hot water demand via tap or shower.
YES
Has the boiler high limit thermostat activated?
NO
Pump water to the Heatslave tank. Burner on. Pump on. Diverter valve off.
Output to domestic hot water.
YES
Activate the pump overrun. Pump water to the Heatslave tank. Pump on. Diverter valve off. Burner off.
NO
Has the boiler high limit thermostat activated?
YES
Activate the pump overrun. Pump water to the Heatslave tank. Pump on. Diverter valve off. Burner off.
NO
Heatslave tank demand via domestic hot water thermostat.
YES
Pump water to the Heatslave tank. Burner on. Pump on. Diverter valve off.
Accumulate energy store in the Heatslave tank.
NO
Boiler allowed to cool.


CENTRAL HEATING MODE ONLY
(HEATING selected on programmer)
Domestic hot water demand via tap or shower.
YES
Has the boiler high limit thermostat activated?
NO
Is there a demand to heat the boiler via the central heating and room thermostats?
YES
Activate the pump overrun. Pump water to the Heatslave tank. Pump on. Diverter valve off. Burner off.
YES
Pump water to the Heatslave tank. Pump on. Diverter valve off. Burner on.
Output to domestic hot water dependent on the quantity of hot water available in the Heatslave tank/boiler.
NO
Central heating demand via room or frost thermostat.
NO
Has the boiler high limit thermostat activated?
NO
Boiler allowed to cool.
YES
YES
Has the boiler high limit thermostat activated?
YES
Activate the pump overrun. Pump water to the central heating circuit. Pump on. Diverter valve on.
NO
Is there a demand to heat the boiler via the central heating thermostat?
NO
Supply hot water to the central heating circuit. Pump on. Diverter valve on.
YES
Supply hot water to the central heating circuit. Pump on. Burner on. Diverter valve on.



15. Installation

15.1 After unpacking the appliance it is recommended that all cabinet panels are removed, as described in Section 5, and stored in a safe place to avoid damage during installation and allow easy inspection for leaks after the system has been filled.

15.2 Remove the burner as described below and store in a safe place until the appliance is ready for commissioning.

(a) Conventional Flue Appliance (CF/LLD).

1. Remove the electrical lead plug by depressing the two locking ears and pulling the plug downwards.

2. Remove the burner from the boiler by slackening the two M6 retaining screws located in the burner housing ring and pulling the burner clear. This will require the use of a 5mm allen key.

(b) Room Sealed Balance Flue Appliance (RS).

1. Remove the burner box cover by pulling forwards to release the ball studs. This will be found easier by pulling on the one side of the handle first to release two of the ball studs and then repeating on the other side. Take care not to pivot the remaining two ball studs too far around as this will cause damage to the spring clips.

2. Remove the electrical lead plug by depressing the two locking ears and pulling the plug downwards.

3. Push the electrical lead grommet back through the burner surround box and feed the lead through the hole.

4. Remove the burner from the boiler by slackening the two M6 retaining screws located in the burner housing ring and pulling the burner clear. This will require the use of a 5mm allen key.

15.3 Flue System Installation

Install the appliance flue system as described in Section 7.

15.4 Heating System Installation.

1. Plumb the boiler into the central heating system.

2. Check that all unused sockets have been plugged.

3. The following procedure should be used when filling the system:

Set the diverter valve to the mid position by moving the manual lever to the left hand side and locking in position. Open all radiators and lockshield valves and remove and discard the automatic air vent cap on the Heatslave tank .

Fill the system and check that air is being discharged from the automatic air vent.

Vent each radiator in turn to remove the air from the system. Bleed any air from the appliance pipework using the manual air vents provided.

When the system has been completely vented, turn the Domestic Hot Water Control Thermostat fully anti-clockwise and set the user operating switch to heating and hot water on. The pump will now operate and any remaining air can be purged from the system using the appropriate bleed points.

Return the diverter valve lever to the normal right hand side position.

4. Check the boiler and all pipework connections for leaks.

15.5 Domestic Water Installation

1. Connect the incoming domestic water supply to the 15 mm compression isolating valve.

2. Connect the main domestic hot water supply pipe to the hot water outlet via a 22mm pipe, to ensure minimum pressure drop in the circuit.

3. Ensure that no air traps are formed in the pipe-work as this will cause the flow switch to bounce when a hot or cold tap is turned off rapidly.

4. See section 12 for further details.

15.6 Oil supply installation.

(See Fig. 10 to 12).

NOTE: Never route the oil supply pipe/hose directly below the combustion chamber base.

(a) Double pipe system oil return pipe.

When fitting an RS balanced flue appliance follow 1 to 11. When fitting a CF/LLD appliance follow step 1 and fit a bulkhead fitting to the bracket for the return pipe and continue from step 10.

1. Remove the isolating valve bulkhead fitting by unscrewing the locknut on the underside.

2. Remove the blind grommet from the fixed burner surround box and discard.

3. Replace the blind grommet with the open grommet supplied in the plastic bag.

4. Slacken the pipe retaining clip screw located directly below the grommet hole. When using 12mm copper pipe replace the clip with the larger one supplied.

5. Bend a piece of 10mm or 12mm copper tube (as selected) to the correct profile to allow the pipe to be fed down the side of the appliance. Make a slight chamfer on the end of the pipe to be fed through the grommet to facilitate easy insertion.

6. Lubricate the grommet hole with vaseline (or butter etc.) and slide the pipe through the hole, supporting the grommet on its underside to prevent it dislodging.

7. Feed the pipe through the retaining clip, allowing approximately 80mm of pipe to project beyond the clip, and tighten the retaining screw. Take care not to overtighten the screw!

8. Hold the pipe at the retaining clip and gently pull the pipe forward sufficiently to allow a compression to ¼ inch BSP female fitting to be fitted for connection to the oil return flexible hose.

9. Connect the fitting to the pipe and fit a ¼ inch BSP taper thread flexible hose, ensuring a good seal using PTFE tape or suitable oil sealing compound. The flexible hose should have a ¼ inch BSP rotating union taper fitting at the other end with a 90 degree bend and ¼ inch BSP nipple for connection to the oil pump.

10. Replace the isolating valve bulkhead fitting.

11. Fit the oil supply pipe as described in the following section.

(b) Single pipe system oil supply pipe.

1. Bend a piece of 10mm or 12mm copper tube (as selected) to the correct profile to allow the pipe to be fed down the side of the appliance. The pipe may only be routed along the right hand side of the boiler. When using 12mm pipe fit a 12mm to 10mm compression coupling and connect to the valve with a short piece of 10mm pipe, otherwise connect directly to the valve.

NOTE: Never use soldered joints on the oil supply pipes as this could cause a hazard in the case of a fire.

2. Route the pipe back to the oil supply tank ensuring that it is hard against the boiler, to allow installation of the side panel.

3. With the isolating valve in the correct orientation tighten the back-nut.

4. Turn the isolating cock fully clockwise to close the valve.

5. Open the main oil supply valve at the tank and check for any leaks.

6. Place a suitable container below the bulkhead fitting and open the valve.

7. Draw off at least 2.5 litres of oil until a steady flow of clear uncontaminated oil can be seen and turn off the isolating valve.

NOTE: This method may not be possible on some installations where a sub-gravity system used. Where the problem arises bleed the system using the oil pump as described in Section 16 and remove and clean the oil pump filter to remove any debris collected as result of installation.

15.7 Replace the electrical panel and side panels in reverse order to the removal procedure of Section 5 and connect the electrical supply as described in Section 13.

16. Commissioning the Appliance

Ensure that no foreign matter is left in the system as this could cause damage to the appliance.

Check that the electrical supply to the appliance is switched off.

16.1 Domestic Hot Water System

Check that the mains water supply has been fully flushed out at installation.

16.2 When commissioning the appliance after initial installation follow the procedure from 16.3, otherwise remove the burner first as described in Section 18.3.

16.3 Appliance and System Preparation

1. After initial installation and checking for leaks, as previously described, drain down the system sufficiently to add a flushing agent. Flush the system in accordance with BS 7593:1992.

2. Fill the system using one of the methods described in Section 10, adding a suitable corrosion inhibitor in accordance with BS7593:1992.

3. Check that the pressure relief valve operates by turning the knob anti-clockwise until water is expelled from the discharge pipe.

4. Set the Expansion Vessel Pressure

The charge pressure of the expansion vessel as despatched is 0.5 bar, which is equivalent to a static head of 5 metres (16.7 ft.). The charge pressure must not be less than the static head at the point of connection. See Figs 13 and 14. A Schraider type tyre valve is fitted to the expansion vessel to allow the charge pressure to be increased if necessary.

5. Set the System Pressure

Fill the system until the pressure gauge shows 1.5 bar (21.5 lb./in^2) and check for water soundness. Release water from the system, using the pressure relief valve knob, until the System Design Pressure is obtained, up to a maximum of 1.5 bar.

System Design Pressure in bar = Static Head of the System in bar + 0.3.

NOTE: 1 bar is equivalent to 10.2 metres (33.5 ft) of water. Set the movable pointer giving a permanent record of the set system pressure.

If the pressure indicated on the pressure gauge is greater than 2.5 bar when operating at the maximum central heating temperature, an extra expansion vessel must be fitted to the system as close as possible to the appliance central heating return connection. Refer to Section 10 for further information on system capacities.

Any extra vessel fitted must be pressurised to the same figure as the integral vessel. If the expansion vessel fails then the specified replacement must be fitted.

16.4 Check the Burner

1. Check that the nozzle and electrode settings are correct for the burner. See Fig 21.

2. Check that the nozzle lies central with the combustion head hole.

3. Check for any visible defects.

16.5 Replace the burner.

1. Connect the flexible oil supply hose to the isolating valve bulkhead fitting and tighten sufficiently to form a good seal. Where a double pipe system is being used fit the bypass plug, as described in Fig. 10 and connect the oil return pipe fitting.

2. With the sponge O-ring gasket around the burner blast tube insert the burner into the housing tube. Push the burner firmly forward to compress the gasket and tighten the two locking screws with a 5mm allen key.

NOTE: It is important that a good seal is made between the burner and the boiler to prevent re-circulation of the flue gases from the combustion chamber to the burner inlet, or the room in the case of a CF/LLD appliance.

3. On the RS balanced flue model, feed the electrical lead back through the hole in the burner surround housing and fit the grommet into the hole ensuring a seal is made.

4. Re-connect the electrical lead plug into the electrical box.

16.6 Check the installation.
1. Check that the appliance is correctly wired as described in Section 13.
2. Check that all baffles are correctly located and the heatshield is correctly mounted as shown in Fig 22.
3. Check that the baffle retainer is correctly mounted as shown in Fig 22.
4. Check that the four thermostat phials are correctly located in the thermostat pockets positioned in the top front of the boiler and in the Heatslave tank, as shown in Fig 3 and 4.
5. Check that all of the air-ways to the burner are clear of any obstruction.
16.7 Fit a pressure gauge and manifold to the burner pump at the point indicated in Fig 10.
16.8 Turn on the electricity to the appliance.
16.9 Bleed the burner (single pipe system only).
Release the fuel bleed port on the manifold and place a suitable receptacle beneath. Turn on the Central Heating Control Thermostat. Set the operating switch (or programmer) to **heating and hot water** and allow the burner to run through to Lockout. Wait two minutes and reset the burner control box. Repeat the procedure at least three times or until a steady stream of oil, without air, is exhausted from the bleed port. Re-lock the bleed port.
16.10 Adjust the air shutter and pump pressure to the settings recommended in the appropriate Tables 2 and 3. After a pre-ignition period of approximately 15 seconds the burner should ignite. Flame sensing is carried out by means of a photocell mounted in the burner body. Should the boiler fail to establish a normal firing pattern (or should flame failure occur during running) the absence of a flame is sensed and the control box is monitored to a safe lockout condition and the burner is shut down. The Lockout indicator light on the appliance facia panel will illuminate indicating that the burner has gone to lockout. In this instance wait two minutes, remove the appliance front cover and press the red lockout reset button mounted on the burner control box. Another start sequence is then initiated. Repeat the procedure until a flame is established.
NOTE: Persistent Lockout when running indicates a fault and a Service Engineer should be consulted.
16.11 Run the boiler for approximately three minutes and then switch off checking that there is no after-spurting from the nozzle. This can be detected by oil saturation on the blast tube. If after-spurting occurs, remove the burner from the boiler, unscrew the nozzle and while holding the burner in a vertical position, fill the nozzle holder with oil. Refit the burner and continue to run the boiler for three minute periods until after-spurting stops.
Use of a "T" piece pressure gauge manifold will increase the oil line volume and hence increase the degree of after-spurting.
16.12. Run the boiler for a further 15 minute period and then finally fine tune the air shutter setting to give the CO_2 levels specified in Tables 2 and 3 less 0.5% CO_2. During this period some smoke will be emitted due to the burning of organic binder in the base insulation board. Smoke readings will therefore be inaccurate at this point.
NOTE: A flue gas sampling point is located on the boiler top plate.
16.13. Check that the smoke reading is in the range 0-1. If this cannot be achieved check that the burner head is set correctly and the nozzle is in good condition.
16.14. Check that the flue gas temperature does not exceed the values specified in Tables 2 and 3. If the flue gas temperature is too high, check that the baffles are correctly located. If the baffles are correctly located then reduce the pump pressure since nozzle variations of up to + or-15% may occur.
16.15 Turn off the electrical supply to the appliance and isolate the oil supply to the burner. Remove the oil pressure gauge and manifold and re-fit the blanking plug. Check the oil system for any signs of leakage.
16.16 On the RS balanced flue model re-fit the burner box cover by lining up the four ball studs, and the polarising pin in the top flange of the box, and firmly pushing forward. Check that the cover is properly seated by pressing forwards on the front top and then bottom face of the box to ensure a room seal is achieved. On the CF/LLD model fit the cabinet front panel.
16.17 Allow the burner to run for a further five minutes and then recheck the CO_2 level and adjust the air setting if required. With the burner cover/panel fitted as 16.16, repeat the previous test procedure and check that the smoke is in the range 0-1. Repeat the fine tuning procedure if found necessary.
16.18 Re-fit the blanking plug in the flue sampling hole.
16.19 Refit the cabinet top and front panels in reverse order to that described in Section 5.
16.20 Operation
Turn on the electricity supply to the appliance
Domestic Hot Water Mode
Set the operating switch (or programmer) to off and fully open a hot tap.
The pump should operate to allow primary water to flow to the Heatslave tank. The burner should not operate.
Close the hot tap and set the Domestic Hot Water Control Thermostat to maximum and the operating switch (or programmer) to hot water on. The burner and pump should now operate to allow primary water to flow to the Heatslave tank.
Set the Domestic Hot Water Control Thermostat to the minimum setting and wait for the burner and pump to switch off. The Heatslave tank will now be charged to its minimum energy level and is available for domestic hot water usage.
Fully open a hot water tap. The burner and pump should now operate and hot water should be available at the hot tap.
The 26/32 appliance has no flow restrictor and the maximum flow rate is dependent on the cold inlet supply pressure. This can be manually adjusted at the mains cold water inlet isolating valve. The maximum recommended flow rate for this model is 22 litres/min (4.8 gallons/min).
Fully close the tap and check that the burner and pump switch off.
NOTE: The burner fan will operate for a further period of 50 seconds when a low level discharge post purge unit is fitted. The pump may also remain on for a short period if the boiler high limit thermostat has tripped out and activated the pump overrun.
Central Heating Mode
Check that all of the radiator valves are open and set the room thermostat to maximum. Set the Central Heating Control Thermostat to maximum and turn the Domestic Hot Water Control Thermostat fully anti-clockwise.
Set the operating switch (or programmer) to heating on and hot water on. The burner should ignite, the pump should operate and the diverter valve should open to allow primary water to flow to the central heating circuit.
Check the system to ensure all of the radiators are heating up evenly. Balance the system so that the required temperature difference across the heating flow and return pipes is obtained relevant to the heating load.
Set the Central Heating Control Thermostat (or room thermostat fitted) to minimum and check that the burner, pump and diverter valve switch off.
Domestic Hot Water and Central Heating Mode
Set the Central Heating Control Thermostat to maximum and turn the Domestic Hot Water Control Thermostat fully anti-clockwise. Set the operating switch (or programmer) to heating on and hot water on. Set the room thermostat to maximum. The burner, pump and diverter valve should all operate allowing water to be pumped to the central heating circuit.
Set the Domestic Hot Water Control Thermostat to maximum. The diverter valve should close and divert the flow to the Heatslave tank.
16.20 Completion of Commissioning
If the appliance is being passed over to the user immediately, refer to Section 17 and set the controls to the users requirements.
If the appliance is to be left inoperative, set the operating switch (or programmer) to OFF.
Turn off the oil supply at the isolating valve and switch off the electricity supply.
If there is any possibility of the appliance and system being left inoperative during frost conditions then drain the appliance and system.

17. Users Instructions

17.1 Hand the Users Instructions to the user or purchaser for retention; instruct them in the efficient and safe operation of the appliance and the heating/hot water system.

17.2 Advise the user or purchaser of the precautions necessary to prevent damage to the system and to the heating/hot water system remaining inoperative during frost conditions.

17.3 Finally, advise the user that for continued efficient and safe operation of the appliance, it is important that adequate servicing is carried out by a qualified engineer at least once a year.

17.4 Worcester Heat Systems Limited will be pleased to discuss and offer a comprehensive maintenance contract.

Set the system controls to the users requirements.

18. Routine Cleaning and Inspection

18.1 Routine Servicing

To ensure efficient trouble free operation, the following should be carried out at least once a year for appliances using 28 second kerosene and twice a year for appliances using 35 second gas oil.

IMPORTANT: Disconnect the electrical supply at the mains before commencing any servicing. Turn off the oil supply at the service cock.

1. Carry out a pre-service check and note any operational faults.

2. Check and clean the burner.

3. On the CF model check and clean the air intake grille located in the boiler room.

4. On the RS balanced flue model check and clean the air intake ducts at the rear and underneath the boiler and the air intake grille at the end of the terminal.

5. Check and clean the baffle retainer.

6. Check and clean the baffles.

7. Check and clean the heat exchanger surface

8. Check the heatshield.

9. Check the combustion chamber insulation board.

10. Check that the flue system is unobstructed and clean as necessary.

11. If the appliance has been installed in a compartment, check that the ventilation areas are clear.

12. Clean all oil filters.

Some of the servicing points are covered more fully in the instructions following:

18.2 Pre-Service Check

1. Remove the cabinet front and top panels as described in Section 5.

2. On the RS balanced flue model remove the burner box cover as described in Section 5.5.

3. Operate the appliance and system. Note any faults which may need to be corrected during the service.

18.3 Clean the Burner

1. Remove the burner.

(a) Isolate the electrical supply to the appliance

(b) Isolate the oil supply at both the oil tank and the isolating valve situated above the burner. (see Fig. 3 and 4).

(c) On the RS balanced flue model remove the burner box cover by pulling forwards to release the ball studs. This will be found easier by pulling on one side of the handle first to release two of the ball studs and then repeating on the other side. Take care not to pivot the remaining two ball studs too far around as this will cause damage to the spring clips.

(d) Disconnect the electrical lead from the control box by depressing the two locking ears on the plug and pulling downwards.

(e) On the RS balanced flue model feed the electrical lead back through the grommet seal to give sufficient play to allow withdrawal and inspection of the burner.

(f) Slacken the two M6 burner locking screws and remove the burner.

4. Clean the fan impeller using the following procedure:

(a) Remove the air adjustment cover.

(b) Separate the main body of the burner from the burner front by removing the M5 allen screw (located beneath the air adjustment screw), using a 4mm allen key.

(c) Note the position of the air damper adjustment and check the air damper moves freely.

(d) Check the air path of the burner head is clear.

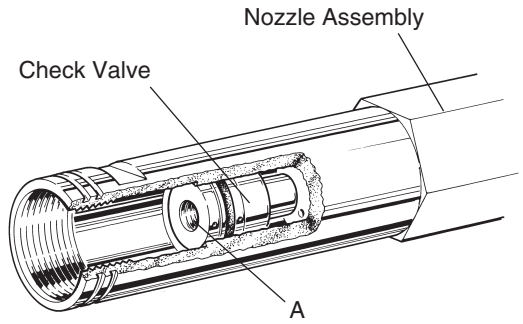
(e) Clean both sides of the fan impeller and remove any debris from the burner housing.

(f) Check the impeller rotates freely.

(g) Re-assemble the components.

3. Remove the combustion head and thoroughly clean any deposits.

Fig. 20. Mechanical Shut-off Valve



4. Inspection of Mechanical Shut-off Valve.

(a) Remove the nozzle

(b) Fasten an M5 screw, with a minimum length of 30mm, into the threaded hole (A) and pull the screw to withdraw the check valve.

(c) Check that the nozzle holder is clear of any debris and clean if necessary.

(d) Check that the three holes in the check valve are clear of any debris. Discard the check valve if the holes cannot be cleared or if the unit is defective and replace with a new one.

(e) Replace in the reverse order.

5. It is strongly recommended that the oil atomising nozzle is replaced at each service. If this is not possible then remove and clean the integral filter. Under no circumstances should the nozzle be stripped into its component parts and never attempt to clean the nozzle tip.

6. Check the electrodes and reset if necessary as shown in Fig. 21.

7. Replace the combustion head. Check that the nozzle lies central to the combustion head and the head settings are as shown in Fig. 21.

8. Withdraw the photocell from its housing and clean.

9. Remove and clean the oil pump internal filter using kerosene or white spirit. The internal filter is accessed by removing the oil pump cover on the Danfoss BFP 11 and Suntec AS47C as indicated in Fig. 10.

9. It is recommended that the standard flexible oil line is replaced at each yearly service to prevent the possibility of a leak due to ageing.

10. Reassemble the burner components.

11. Check the sponge O-ring seal located around the combustion head and replace if necessary. It is imperative that this seal is in good condition since failure will cause flue gases to be re-circulated into the burner inlet or the room in the case of a CF/LLD appliance.

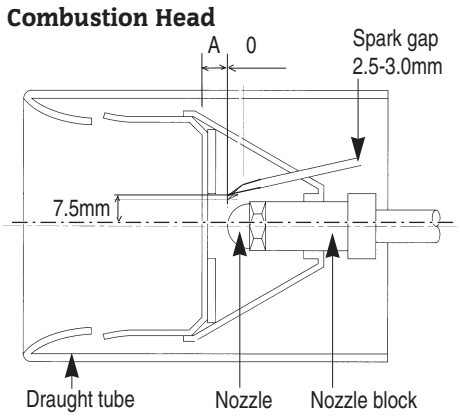
18.4 Remove the paper element from the external oil filter and replace it. If the filter contains a washable element, thoroughly clean in kerosene or white spirit and reassemble into the filter.

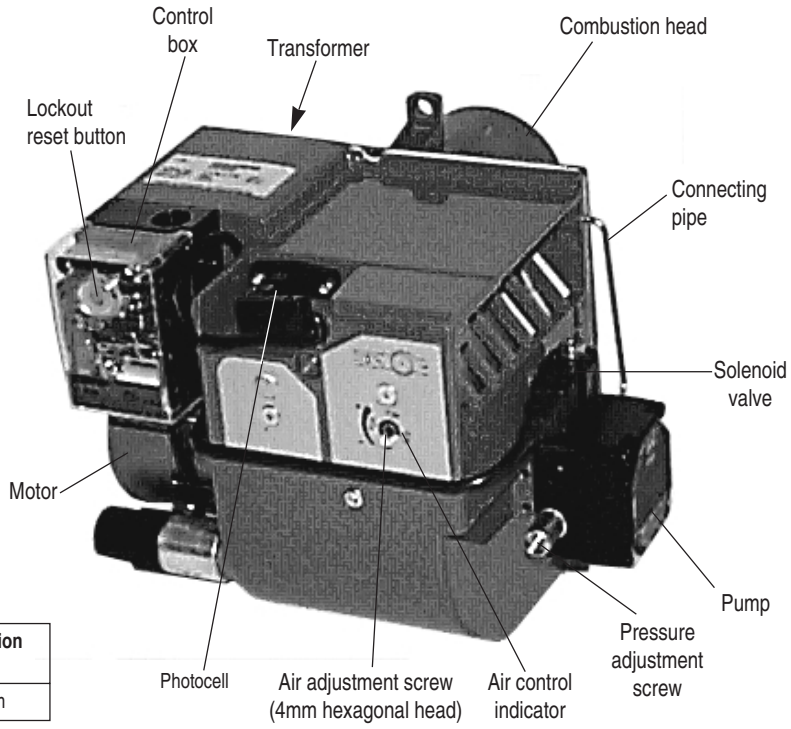
18.5 Clean the air ducts. (RS balanced flue model only).

1. Remove the rear duct top cover.

2. Shine a light down the rear duct and inspect both the rear and under duct for any sign of debris and clean where necessary using a flexible hose connected to a vacuum cleaner. A short length of garden hose would be suitable for this purpose.

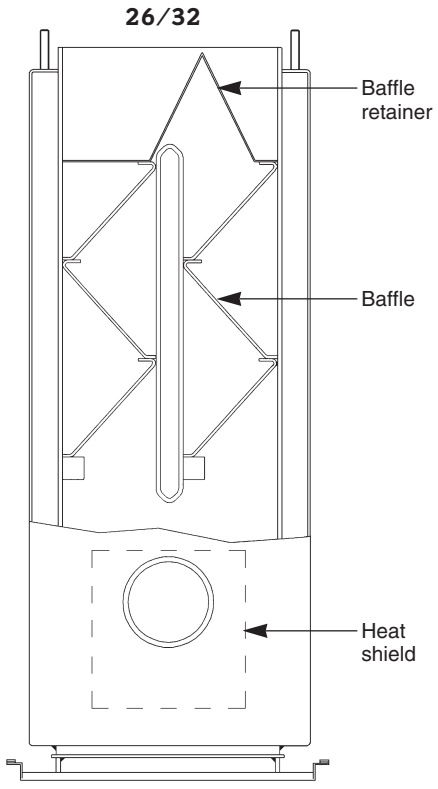
Fig. 21. Electro Oil Sterling 40 Burner.





Output kW	Combustion Head	Dimension A
26-32	PL 6/7/21.5/10 x 78 mm	3.5mm

Fig. 22. Location of Boiler Flueway Baffles.



ENSURE THAT ALL BAFFLES ARE FIRMLY SEATED IN POSITION

3. Replace the rear duct top cover.
4. Check the oil bleed holes are clear. These are located in the base of the burner cover box and bottom front face of the burner housing.

18.6 Clean the Boiler

1. Remove the boiler top access door by releasing the two M10 nuts, check the fibreglass rope seal and replace if necessary.
2. Remove and check the baffle retainer. See Fig.22.
3. Remove the baffles, clean and check their condition. Replace any baffles considered to be badly corroded.
4. Thoroughly clean all of the heat exchanger surfaces using a stiff wire brush and vacuum clean all loose debris from the combustion chamber. Take care not to damage the base insulation!
5. Remove and check the heat shield. See Fig.22.
6. Check the condition of the combustion chamber base insulation and replace if there is any sign of significant damage.
7. Check and clean the flue system if necessary.
8. Replace the items in reverse order noting the baffle positions shown in Fig.22.

18.7 Check that a fire valve is fitted to the incoming oil line with the body located outside the premises and the detection element located within the appliance case. A fire valve clip is provided for this purpose as shown in Figs 3&4. Test the operation of the fire valve to ensure that the mechanism operates and that the oil supply is completely isolated.

NOTE: The fire sensing element must be located on the top face of the burner surround box on RS balanced flue models, as shown in Fig.4, to allow quick detection of a dangerous situation.

18.8 Re-commission the Burner

1. Connect the flexible oil supply hose to the isolating valve bulkhead fitting and tighten sufficiently to form a good seal. Where a double pipe system is being used connect the oil return flexible hose to return pipe fitting.

2. With the sponge O-ring gasket around the burner blast tube insert the burner into the housing tube. Push the burner firmly forward to compress the gasket and tighten the two locking screws using a 5mm Allen key.

NOTE: It is important that a good seal is made between the burner and the boiler to prevent re-circulation of the flue gases from the combustion chamber to the burner inlet, or the room in the case of a CF/LLD appliance.

3. On the RS balanced flue model feed the electrical lead back through the hole in the burner surround housing and fit the grommet into the hole ensuring a seal is made.

4. Reconnect the electrical lead plug into the electrical box.

5. Turn on the oil supply at the service cock.

6. Recommission the burner as described in Section 16.

19. Replacement of Parts

WARNING

Switch off the electricity, oil and water supplies before replacing any components.

After the replacement of components, always check for soundness of connection of the above supplies where relevant and carry out functional checks as described in Section 16.

19.1 Component Access

To replace components it will be necessary to remove one or more sections of the cabinet as described in Section 5.

19.2 Component Replacement

1. Burner

For removal and servicing refer to Section 18.3.

2. Pump

Check that the electrical supply has been turned off.

Remove the appliance front panel and withdraw the burner to prevent water ingress.

Turn off the isolating valves mounted on the outlet of the pump and the boiler body, and drain the residual water via the drain plug below the pump inlet.

In most cases the pump may be replaced by simply removing and changing the motor/impeller assembly. This can be done by undoing the four screws holding the head to the body and pulling the head forwards. In cases where the pump body also needs replacing, undo the two union nuts and remove the pump from between the pipework. Note: A residue of water will remain in the pump.

Remove the pump electrical cover and disconnect the electrical leads taking note of the wire positions.

Replace the pump in reverse order

NOTE: The direction flow indicator on the pump should point upwards and the speed adjustment should be set to maximum (No: 3)

Open the valves and fill the system as described in Section 16.

3. Diverter Valve

Check that the electrical supply has been turned off.

Remove the appliance front, top panel and withdraw the burner to prevent water ingress.

Drain the boiler and Heatslave tank.

Turn off the isolating valve mounted on the boiler body, and drain the residual water via the drain plug below the pump inlet.

The diverter valve has a removable head to make replacement easier.

Remove the electrical box top cover.

Remove the diverter valve connector plug at **X8** on the control board.

Remove the diverter valve heyco bush from the electrical box and withdraw the electrical lead.

To gain access remove the electrical box as described in Section 19.2 (11).

To replace the diverter valve head slacken the screw holding the diverter valve cover and remove.

Undo the two brass screws, remove the diverter valve head and fit a replacement in reverse order.

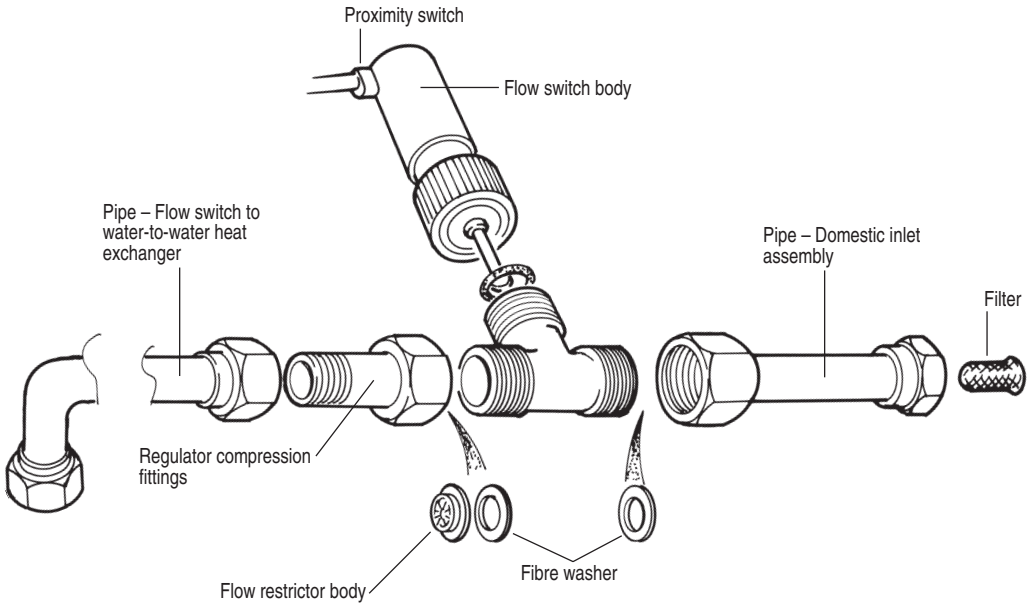
To replace the complete diverter valve undo the diverter valve compression fitting connected to the central heating flow pipe.

Undo the diverter valve compression fitting connected to the heatslave tank pipe and slacken the compression fitting on the heatslave tank.

Undo the diverter valve inlet compression fitting and slacken the pump inlet union.

Withdraw the diverter valve and fit replacement in reverse order.

Fig. 23. Flow Switch Assembly.



NOTE: A residue of water will remain in the diverter valve.
Open the valves and fill the system as described in Section 16.

4. Heatslave Tank

Check that the electricity and mains water supplies have been turned off.
Remove the appliance front, top and left-hand side panel.
Withdraw the burner to prevent water ingress.
Drain the boiler and Heatslave tank.
Remove the electrical box as described in Section 19.2 (11).
Remove the flow switch assembly and the domestic hot water heat exchanger as described in Sections 19.2 (8) and 19.2 (9)
Undo the compression fitting connecting the diverter valve to the Heatslave tank and remove the M6 nut and bolt holding the Heatslave tank onto the appliance base.
Remove the pressure relief valve as described in Section 19.2 (6).
Move the tank slightly to the left to dislodge the diverter valve fitting from the tank.
Raise the front end of the tank sufficiently to clear the base lip and withdraw the tank.
Remove the remaining components from the tank and refit to the replacement tank.
Fit a replacement tank in the reverse order.
Open all valves and fill the system as described in Section 16.

5. Expansion Vessel

Check that the electrical supply has been turned off.
Remove the appliance front panel and withdraw the burner to prevent water ingress.
Drain the boiler
Undo the nut connecting the vessel flexible pipe to the boiler.
Remove the vessel retaining bar by pulling upwards.
Withdraw the vessel and replace in the reverse order.
Open all valves and fill the system as described in Section 16.

6. Pressure Relief Valve

Check that the electrical supply has been turned off.
Remove the appliance front panel, top panel and withdraw the burner.
Drain the boiler.
Undo the compression fitting connecting the pipe to the relief valve.
Undo the union nut on the right hand side and withdraw the relief valve, taking care not to lose the fibre washer seal.
Fit a replacement valve in the reverse order.
Open all valves and fill the system as described in Section 16.

7. System Pressure Gauge

Check that the electrical supply has been turned off.
Remove the appliance front panel and withdraw the burner.
Drain the boiler.
Turn off the isolating valves mounted on the outlet of the pump and the boiler body, and drain the residual water via the drain plug below the pump inlet.
Unscrew the gauge from the pump inlet manifold.
Fit a new gauge in the reverse order.
Open all valves and fill the system as described in Section 16.

8. Domestic Hot Water Heat Exchanger

Check that the electricity and mains water supplies have been turned off.
Remove the appliance front panel, top panel and withdraw the burner to prevent water ingress.
Drain the boiler and approximately 1 litre of water from the Heatslave tank using the drain point provided at the bottom front face of the tank. This will prevent excessive residual spillage from the pipework when disconnecting.
Close the mains water isolating valve located on the flow switch inlet pipe. Undo the compression fitting connecting the flow switch to the isolating valve. Undo the union nut connecting the flow switch to the heat exchanger and remove the flow switch assembly.
Drain the residual water from the hot water pipework and undo the union nut connecting the pipework to the heat exchanger.
Undo the two remaining union nuts located on the domestic hot water heat exchanger.
Take care not to lose any of the four tap washers and replace any which are damaged.
Withdraw the heat exchanger and fit a replacement in the reverse order.
Open all valves and fill the system as described in Section 16.
NOTE: It may be advantageous to use a tap spanner when undoing the heat exchanger union nuts.

9. Flow Switch. (See Fig 23)

Check that the electricity supply and mains water supplies are turned off.
To replace the Flow Switch proceed as follows:
NOTE: Do not replace individual components of the Flow Switch, it must be replaced as a whole unit.
Remove the appliance front panel, top panel and withdraw the burner to prevent water ingress.
Remove the electrical box top cover.
Remove the proximity switch connector plug at **X6** on the control board.
Remove the proximity switch Heyco bush from the electrical box and withdraw the electrical lead.
Close the mains water isolating valve located on the flow switch inlet pipe and drain the residual water from the hot water pipework.
Undo the nut connecting the flow switch to the domestic inlet pipe assembly.
Undo the nut connecting the flow switch to the regulator compression fitting.
NOTE: While undoing these nuts it is essential that the brass section of the flow switch body is used for holding and not the plastic moulding.
Pull the nuts back and extract the flow switch assembly.
Fit a new flow switch and new washers in the reverse order, ensuring that the flow switch body is tilted up at an angle of approximately 15 degrees with the plastic moulding towards the boiler body.
To gain access to the filter, undo the nut connecting the domestic inlet pipe assembly and the isolating valve.
Remove the domestic inlet pipe assembly.
Clean or replace the filter as required.
Reassemble the components in the reverse order.

10. Automatic Air Vent

Check that the electrical supply has been turned off.
Remove the appliance front panel, top panel and withdraw the burner to prevent water ingress.
Remove the electrical box as described in Section 19.2 (11).
Drain the boiler and the heatslave tank..
Unscrew the automatic air vent and fit a new one in the reverse order.
Fill the system as described in Section 16.

11. Electrical Box

NOTE: It may be found easier to gain access to some components such as the diverter valve by removing the electrical box as described here.
Check that the electrical supply has been turned off.
Remove the appliance front panel and top panel.
Remove the fire valve if fitted to the fire valve clip provided on the back of the electrical box.
Remove the electrical box top cover by removing the four self tapping screws.
Unscrew the wing nut holding the electrical box base onto the support arm and remove the screw.
Remove the split pins and phial retaining plug from the boiler and Heatslave tank thermostat phial pockets. Carefully withdraw the thermostat phials ensuring that the copper capillary tubes do not become kinked.
Slacken the two self tapping screws on the underside of the electrical box holding the facia panel in place.
Remove the three self tapping screws holding the facia panel and electrical box onto the side panels.
Unplug the burner electrical harness from the underside of the electrical panel.

Carefully withdraw the electrical box and temporarily seat in a suitable place such as the top of the boiler.
Reasemble the electrical box in reverse order

12. Thermostats
Check that the electrical supply has been turned off.
Remove the appliance front, top panel.
Remove the electrical box top cover by removing the four self tapping screws.

CENTRAL HEATING CONTROL THERMOSTAT
Remove the split pin from the thermostat phial pocket located on the front, left hand side of the boiler.
Carefully withdraw the thermostat phial from the pocket.
Remove the heyco split bush and slide the copper capillary tube through the slot, freeing the capillary tube from the electrical control box.
Remove the spade connectors and note the terminal positions of the various wires. See Fig 16.
Pull the thermostat control knob off the spindle and remove the central clamping nut and washer.
Remove the thermostat and replace with a new one using the reverse procedure.
With the thermostat in position, the excess capillary must be coiled (without tight bends) and positioned so that it does not come into contact with any hot surface.
When reassembling the split bush the slit should be positioned opposite to the slot on the electrical box.
The thermostat phial should be checked to ensure that it is clean and free of any debris that would otherwise cause poor thermal conduction when placed in the phial pocket. Ensure that the split pin is replaced to prevent the phial springing free of the pocket during operation.

DOMESTIC HOT WATER CONTROL THERMOSTAT
The domestic hot water thermostat phial is located on the front face of the Heatslave tank. In all other respects the removal procedure is the same as the central heating control thermostat.

BOILER HIGH LIMIT THERMOSTAT
The high limit thermostat phial is located in the same pocket as the central heating control thermostat.
To remove the thermostat follow the same procedure as the central heating control thermostat, but to remove the body from the electrical box, undo the two M4 screws located at the rear of the panel.
NOTE: The high limit thermostat phial should be positioned in the phial pocket before the central heating control thermostat phial.

MANUAL RESET OVERHEAT THERMOSTAT
Remove the phial retaining plug from the thermostat phial pocket located next to the electrical box support bracket.
Carefully withdraw the thermostat phial from the pocket.
Remove the heyco split bush and slide the copper capillary tube through the slot, freeing the capillary tube from the electrical box.
Remove the electrical spade connectors and undo the securing nut located on the underside of the electrical box.
Remove the thermostat and replace with a new one using the reverse procedure.
With the thermostat in position, the excess capillary must be coiled (without tight bends) and positioned so that it does not come into contact with any hot surface.
When reassembling the heyco split bush the slit should be positioned opposite to the slot on the electrical box.
The thermostat phial should be checked to ensure that it is clean and free from any debris that would otherwise cause poor thermal conduction when placed in the phial pocket.
Ensure that the phial retaining plug is replaced to prevent the phial springing free of the pocket during operation.

13. Control Board
Check that the electrical supply has been turned off.
Remove the appliance front, top panel and the electrical box top cover.
Remove the two screws holding the facia to the underside of the electrical box and the two screws holding the facia to the side panels.
Remove the wires from terminals **X1** and **X2** and unplug the wiring harness connectors.
Gently prise back the support pillar locating tabs, one by one, and pull the control board clear.
Withdraw the board from the electrical box.
Fit a new control board in the reverse order.

14. Operating Switch
Check that the electricity supply has been turned off.
Remove the appliance front, top panel and the electrical box top cover.
Remove the two screws holding the facia to the underside of the electrical box and the two screws holding the facia to the side panels. Remove the MAINS ON and LOCKOUT indicator light connectors from terminals **X9** and **X11** on the control board.
Remove the spade connectors from the domestic hot water central heating control thermostat and operating switch noting their positions. See Fig 16.
Depress the operating switch locking tabs behind the facia and remove the operating switch and replace in reverse order.

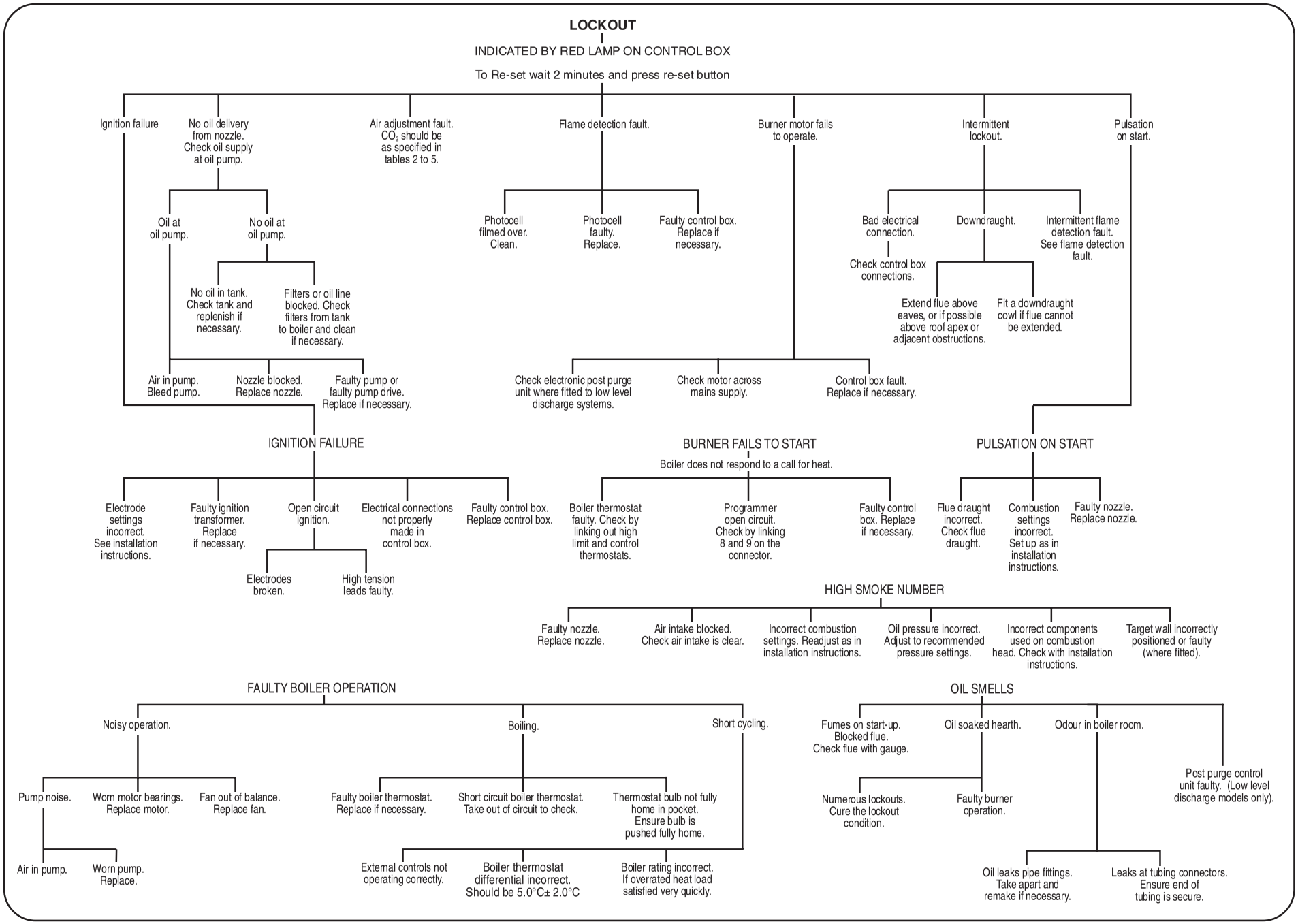
15. Programmer (where fitted)
Check that the electricity supply has been turned off.
Remove the appliance front, top panel and the electrical box top cover.
Remove the two screws holding the facia to the underside of the electrical box and the two screws holding the facia to the side panels. Remove the MAINS ON and LOCKOUT indicator light connectors from terminals **X9** and **X11** on the control board.
Remove the spade connectors from the domestic hot water and central heating control thermostat noting their positions. See Fig 16.
Unplug the programmer from the control board and carefully remove the facia from the cabinet assembly.
Remove the four pozi-drive screws holding the programmer to the housing and withdraw the programmer.
Fit a replacement programmer in the reverse order having first set the switch on the rear of the unit to P. as described in the fitting instructions.
Use only the specified programmer. Do not attempt to fit any other model or make.

16. Baffles
For replacement of boiler baffles see Section 18.6.

20. Short Parts List

Burner Components – Electro Oil

Part		Manufacturers Reference	Qty	WHS Part No.
Burner Control 1.	Box	Satronic TF832C.3	1	8 716 156 648-0
	Photocell	Satronic MZ770	1	8 716 142 735-0


LOCKOUT
INDICATED BY RED LAMP ON CONTROL BOX
To Re-set wait 2 minutes and press re-set button
Ignition failure
No oil delivery from nozzle. Check oil supply at oil pump.
Air adjustment fault. CO_2 should be as specified in tables 2 to 5.
Flame detection fault.
Burner motor fails to operate.
Intermittent lockout.
Pulsation on start.
Oil at oil pump.
No oil at oil pump.
No oil in tank. Check tank and replenish if necessary.
Filters or oil line blocked. Check filters from tank to boiler and clean if necessary.
Air in pump. Bleed pump.
Nozzle blocked. Replace nozzle.
Faulty pump or faulty pump drive. Replace if necessary.
Photocell filmed over. Clean.
Photocell faulty. Replace.
Faulty control box. Replace if necessary.
Check electronic post purge unit where fitted to low level discharge systems.
Check motor across mains supply.
Control box fault. Replace if necessary.
Bad electrical connection.
Check control box connections.
Downdraught.
Extend flue above eaves, or if possible above roof apex or adjacent obstructions.
Fit a downdraught cowl if flue cannot be extended.
Intermittent flame detection fault. See flame detection fault.
IGNITION FAILURE
Electrode settings incorrect. See installation instructions.
Faulty ignition transformer. Replace if necessary.
Open circuit ignition.
Electrical connections not properly made in control box.
Faulty control box. Replace control box.
Electrodes broken.
High tension leads faulty.
BURNER FAILS TO START
Boiler does not respond to a call for heat.
Boiler thermostat faulty. Check by linking out high limit and control thermostats.
Programmer open circuit. Check by linking 8 and 9 on the connector.
Faulty control box. Replace if necessary.
PULSATION ON START
Flue draught incorrect. Check flue draught.
Combustion settings incorrect. Set up as in installation instructions.
Faulty nozzle. Replace nozzle.
HIGH SMOKE NUMBER
Faulty nozzle. Replace nozzle.
Air intake blocked. Check air intake is clear.
Incorrect combustion settings. Readjust as in installation instructions.
Oil pressure incorrect. Adjust to recommended pressure settings.
Incorrect components used on combustion head. Check with installation instructions.
Target wall incorrectly positioned or faulty (where fitted).
FAULTY BOILER OPERATION
Noisy operation.
Boiling.
Short cycling.
Pump noise.
Worn motor bearings. Replace motor.
Fan out of balance. Replace fan.
Air in pump.
Worn pump. Replace.
Faulty boiler thermostat. Replace if necessary.
Short circuit boiler thermostat. Take out of circuit to check.
Thermostat bulb not fully home in pocket. Ensure bulb is pushed fully home.
External controls not operating correctly.
Boiler thermostat differential incorrect. Should be 5.0°C± 2.0°C
Boiler rating incorrect. If overrated heat load satisfied very quickly.
OIL SMELLS
Fumes on start-up. Blocked flue. Check flue with gauge.
Oil soaked hearth.
Odour in boiler room.
Post purge control unit faulty. (Low level discharge models only).
Numerous lockouts. Cure the lockout condition.
Faulty burner operation.
Oil leaks pipe fittings. Take apart and remake if necessary.
Leaks at tubing connectors. Ensure end of tubing is secure.

WORCESTER
Bosch Group

Worcester Heat Systems Limited, Cotswold Way, Warndon, Worcester WR4 9SW.
Telephone: (01905) 754624 Fax: (01905) 754619
www.worcester-bosch.co.uk

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WORCESTER

Bosch Group

OIL HEATSLAVE

12/14 15/19 20/25

CONVENTIONAL FLUE AND ROOM SEALED BF FLOOR STANDING COMBINATION BOILER FOR CENTRAL HEATING AND MAINS FED DOMESTIC HOT WATER

INSTALLATION AND SERVICING INSTRUCTIONS

BOILER OUTPUT

Domestic Hot Water and Central Heating

12/14	**MINIMUM 12 kW** (41,000 Btu/h) **MAXIMUM 14 kW** (48,000 Btu/h)
15/19	**MINIMUM 15 kW** (51,000 Btu/h) **MAXIMUM 19 kW** (65,000 Btu/h)
20/25	**MINIMUM 20 kW** (68,000 Btu/h) **MAXIMUM 25 kW** (85,000 Btu/h)

THESE INSTRUCTIONS APPLY TO UK MODELS ONLY

THESE INSTRUCTIONS ARE TO BE LEFT WITH THE APPLIANCE

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1. Installation Regulations

1.1 General installation information and advice may be obtained from the Oil Firing Technical Association for the Petroleum Industry (OFTEC). Training courses are also offered by OFTEC, leading to inclusion on their list of registered engineers.

1.2 The appliance should be installed by a competent person. The person installing the appliance should be aware of the Health and Safety at Work Act and take appropriate action to ensure that the regulations are adhered to. In order to give optimum efficiency and trouble free operation the appliance should be commissioned by a qualified engineer. OFTEC recommends the use of registered engineers for the commissioning of oil-fired burners.

1.3 The manufacturers notes must not be taken, in anyway, as overriding statutory obligations.

1.4 The compliance with a British Standard does not, of itself, confer immunity from legal obligations.

In particular the installation of this appliance must be in accordance with the relevant requirements of the following British Standards and regulations in respect of the safe installation of equipment.

BS 5410: part 1: 1997 Code of practice for Oil Fired Boilers.

BS 799: part 5: 1987 Specification for Oil Storage Tanks.

BS 7593: 1992 Code of Practice for treatment of water in domestic hot water central heating systems.

BS 5449: part 1: 1990 Code of practice for Forced Circulation Hot Water and Central Heating for Domestic Premises.

BS 7074: part 1: 1989 Application, selection and installation of expansion vessels and ancillary equipment for sealed water systems.

BS 7671: IEE Wiring Regulations, current edition.

The Building Regulations Part J England and Wales; Part F, Section III Scotland; Part L Northern Ireland.

Local water company bye-laws.

The Control of Pollution (Oil) Regulations.

1.5 To ensure that the installation will perform to the highest standards, the system and components should conform to those mentioned in the instructions.

2. General Information

2.1 These instructions cover both conventional flue (CF)/low level discharge (LLD) and room sealed balance flue (RS) appliances.

2.2 The Worcester Oil Heatslave range of appliances covered in these instructions have been designed to serve domestic central heating and mains pressure domestic hot water requirements, ranging from 12 kW to 25 kW.

2.3 The RS balanced flue appliance forms a fully room sealed system by surrounding the burner with a unique, fully sealed, push fit box. This causes the combustion air to be drawn through a factory sealed air duct formed at the rear and underside of the boiler. The sealed burner gives excellent acoustic noise reduction and alleviates the need for an air brick to be located in the boiler room.

Because the balanced flue system does not rely on the cabinet panels to form the room seal, combustion readings can be taken from the flue outlet plate as on a conventional appliance , and the cabinet panels can be easily removed during installation thereby preventing any damage.

2.4 The boiler is factory set to the mid range output and can be altered, if necessary, by adjusting the burner as specified in tables 2 to 5. The low level discharge and room sealed models are only suitable for use with 28 second Kerosene heating oil.

NOTE: It is a mandatory requirement of the building regulations that only 28 second kerosene is used on low level discharge flues.

2.5 The conventional flue 15/19 and 20/25 models may be converted to burn 35 second gas oil by changing the nozzle and burner setting as specified in Tables 3 and 4.

2.6 A colour co-ordinated twin channel programmer can be fitted to the facia panel. This is available from Worcester Heat Systems as an optional extra.

2.7 Principle appliance components. See Fig 3 and 4.

Oil Fired Burner

A fully automatic oil fired pressure jet burner is used to supply heat to the boiler. The burner can be set to the output requirements as detailed in Tables 2 to 5.

Heatslave Tank

The Heatslave tank is a heatbank containing 46 litres (10 gallons) of primary hot water. The tank temperature is controlled by the Domestic Hot water Control Thermostat and is variable between 55°C and 80°C.

Domestic Hot Water Heat Exchanger

A Water to Water heat exchanger is located on top of the Heatslave tank. Primary water is pumped from the Heatslave tank to the heat exchanger whenever there is a flow of domestic water through a hot water tap. The domestic water thereby extracts the heat from the heatbank giving mains pressure domestic hot water. The domestic hot water temperature can be increased by reducing the water flow rate at the tap and/or adjusting the Domestic Hot Water Control Thermostat to a higher setting.

Diverter Valve

A motorised diverter valve is located on the pump outlet. The valve is normally closed to the primary circuit and is powered open when there is a demand for central heating at a room thermostat or a demand for heat via the Central Heating Control Thermostat.

Pump

An integral circulating pump is incorporated within the appliance casing. This serves the functions of both the central heating circuit and the Heatslave tank. The pump is factory set to Setting 3. This should not be adjusted, since this would impair the domestic hot water performance.

Flow Switch

The domestic mains water inlet is connected to a flow switch which detects when a domestic hot water tap has been opened. This activates the burner and pump when the Domestic Hot Water mode or the Central Heating and Domestic Hot Water mode is selected. If the Facia mounted operating switch or programmer (if fitted) is set to OFF or set to Heating On only, then only the pump will be activated.

Pump Overrun

A pump overrun facility has been incorporated into the control board which allows excess heat to be dissipated to the hot water circuit when there is a demand for central heating via the user operating switch (or programmer where fitted) or to the Heatslave tank. This prevents the possibility of the boiler overheating.

Expansion Vessel

A 12 litre expansion vessel is included within the appliance cabinet.

Manual Reset Overheat Thermostat. See Figs. 3 and 4.

An overheat thermostat is located on the underside of the electrical panel and is accessible by removing the cabinet front panel. If a boiler overheat condition arises, the burner will remain inoperative until the thermostat button is reset.

2.8 OPERATION

The appliance is supplied with a facia mounted operating switch to allow the selection of hot water in the upper position or central heating and hot water in the lower position.

Central Heating and Domestic Hot Water Mode

The appliance will supply heat to the central heating system as required. The water supplied to the central heating circuit can be set to the desired temperature by adjusting the Central Heating Control thermostat.

The Heatslave tank will maintain the temperature set on the Domestic Hot Water Control Thermostat. Demand by the Domestic Hot Water Control Thermostat or a demand for hot water at a tap or shower will override the central heating requirement for the period of the demand. This will generally have no significant effect on the average room temperature.

When the dwelling and boiler are to be heated from cold, heating can be achieved more rapidly by turning the Domestic Hot Water Control Thermostat fully anti-clockwise for the duration of the warm up period. This will prevent the Heatslave tank taking priority for the tank warm up period of approximately 20 minutes.

Domestic Hot Water Mode

The Heatslave tank will maintain the temperature set on the Domestic Hot Water Control Thermostat.

Central Heating Mode

This mode only applies where a two channel programmer has been fitted to the system

The appliance will operate as a conventional oil fired boiler. The water supplied to the central heating circuit can be set to the desired temperature by adjusting the Central Heating Control Thermostat.

A demand for domestic hot water at a tap or shower will override the central heating requirement for the period of domestic hot water demand. This will allow any residual heat in the Heatslave tank to be utilised for domestic hot water purposes.

NOTE: If the Heatslave tank is cold, then no domestic hot water will be obtained from the system.

Off mode

The central heating system will remain off unless there is a demand via the frost thermostat (when fitted), whereby the frost thermostat will activate the pump and burner until the demand is satisfied.

The burner will remain inoperative in all other circumstances.

If a demand for domestic hot water is made at a tap or shower, primary water will be pumped from the Heatslave tank through the domestic hot water heat exchanger. This will provide a limited output of domestic hot water depending on the amount of heat stored in the Heatslave tank.

This function will be found useful during periods where it would be considered undesirable or uneconomical to keep the Heatslave tank constantly hot, but where there may be a demand for small quantities of domestic water for hand washing etc. This would include overnight periods and any periods of very low domestic hot water demand (eg during the summer months). In these circumstances the Heatslave tank can be charged up to maximum temperature once or twice a day as required using the programmer in the Domestic Hot Water mode and with the Domestic Hot Water Control Thermostat set to maximum.

3. Technical Data

Table 1

SPECIFICATIONS				
Model		**12/14**	**15/19**	**20/25**
POWER SUPPLY		230V/240V 50 Hz	230V/240V 50 Hz	230V/240V 50 Hz
HEATING FLOW		22mm	22mm	22mm
HEATING RETURN		1in. BSP	1in. BSP	1in. BSP
COLD WATER MAINS INLET		15mm	15mm	15mm
DOMESTIC HOT WATER OUTLET		22mm	22mm	22mm
CENTRAL HEATING VENT		1in. BSP	1in. BSP	1in. BSP
CENTRAL HEATING MAKE-UP		1in. BSP	1in. BSP	1in. BSP
FUEL LINE		10mm Compression	10mm Compression	10mm Compression
FLUE REQUIREMENT	CF	100mm (4in.)	100mm (4in.)	100mm (4in.)
	RS	Balanced Flue Kit (Sec. 7.3)	Balanced Flue Kit (Sec. 7.3)	Balanced Flue Kit (Sec. 7.3)
HEARTH TEMPERATURE		Below 100°C	Below 100°C	Below 100°C
PRIMARY WATER CAPACITY (TOTAL)		67 litres (14.7 gal.)	67 litres (14.7 gal.)	70.5 litres (15.57 gal.)
MAXIMUM STATIC HEAD		30 m (98 ft.)	30 m (98 ft.)	30 m (98 ft.)
MINIMUM STATIC HEAD		1 m (3.3 ft.)	1 m (3.3 ft.)	1 m (3.3 ft.)
WEIGHT	CF	130Kg (286lbs)	133Kg (293lbs)	145Kg (319lbs)
	RS	134Kg (295lbs)	137Kg (302lbs)	149Kg (328lbs)
OVERALL APPLIANCE HEIGHT		855mm (33.7in)	855mm (33.7in)	855mm (33.7in)
OVERALL APPLIANCE WIDTH		520mm (20.5in)	520mm (20.5in)	520mm (20.5in)
OVERALL APPLIANCE DEPTH		600mm (23.6in)	600mm (23.6in)	600mm (23.6in)
BURNER		Electro Oil Inter B9 A	Electro Oil Inter B9 B	Electro Oil Inter B11C
WATER SIDE RESISTANCE 10°C Difference		7 mbar	8 mbar	18 mbar
WATER SIDE RESISTANCE 20°C Difference		3 mbar	6 mbar	12 mbar
EXIT FLUE GAS MASS FLOW		28 kg/hr	35 kg/hr	46 kg/hr
MAXIMUM DOMESTIC HOT WATER FLOW RATE		15 litres/min. (+ or - 15%) (3.3 gallons/min.)	15 litres/min. (+ or - 15%) (3.3 gallons/min.)	Unrestricted 17 litres/min. (3.7 gallons/min.) recommended
FLOW RESTRICTOR		Lime Green	Lime Green	Not Required
MAX. DOMESTIC HOT WATER TEMPERATURE RISE FOR 90 litres (20 gallons) DRAW OFF		37°C at 15 litres/min.	40°C at 15 litres/min.	40°C at 17 litres/min.
MIN. INLET DOMESTIC WATER PRESSURE (DYNAMIC) FOR MAXIMUM HOT WATER FLOW		1.6 bar	1.6 bar	0.6 bar at 17 litres/min.
CENTRAL HEATING CONTROL THERMOSTAT RANGE		55°C minimum Cut In to 82°C maximum Cut Out		
DOMESTIC HOT WATER CONTROL THERMOSTAT RANGE		55°C minimum Cut In to 80°C maximum Cut Out		
CENTRAL HEATING AND DOMESTIC HOT WATER CONTROL THERMOSTAT DIFFERENTIAL		5°C		
BOILER HIGH LIMIT THERMOSTAT SET POINT		95 ± 2°C		
MANUAL RESET OVERHEAT THERMOSTAT		110 +0–6 °C Cut-out		

12/14 Table 2. Electro Oil Inter B9A Burner (See Fig. 21)

NOMINAL BOILER RATING AT NORMAL OPERATING TEMPERATURE											
Fuel	Nozzle ‡	Pump Pressure (p.s.i.)†	Fuel Flow Rate		Flue Gas Temp. (°C)**	%CO_2	Approx. Air Setting	Appliance			
								Input		Output	
			Kg/h	l/h				kW	Btu/hr	kW	Btu/hr
28 Sec. Kerosene	0.40 60°ES	135	1.11	1.41	195	9.5	8.0	13.5	46,000	12	41,000
28 Sec. Kerosene	0.50 60°ES	100	1.30	1.64	210	10.5	8.5	15.5	53,000	14	48,000

15/19 Table 3. Electro Oil Inter B9B Burner (See Fig. 21)

NOMINAL BOILER RATING AT NORMAL OPERATING TEMPERATURE											
Fuel	Nozzle ‡	Pump Pressure (p.s.i.)†	Fuel Flow Rate		Flue Gas Temp. (°C)**	%CO_2	Approx. Air Setting	Appliance			
								Input		Output	
			Kg/h	l/h				kW	Btu/hr	kW	Btu/hr
28 Sec. Kerosene	0.50 60°ES	110	1.40	1.77	215	10.5	8.5	17	58,000	15	51,000
28 Sec. Kerosene	0.55 80°EH	100	1.59	2.01	225	10.5	8.75	19	65,000	17	58,000
28 Sec. Kerosene	0.60 60°ES	105	1.78	2.25	235	11.5	9.0	21.5	73,000	19	65,000
35 Sec. Gas Oil*	0.50 80°S	155	1.80	2.12	235	11.5	9.0	21.5	73,000	19	65,000

20/25 Table 4. Electro Oil Inter B11C Burner (See Fig. 22) **Convential Flue Appliance (CF/LLD)**

NOMINAL BOILER RATING AT NORMAL OPERATING TEMPERATURE											
Fuel	Nozzle ‡	Pump Pressure (p.s.i.)†	Fuel Flow Rate		Flue Gas Temp. (°C)**	%CO_2	Approx. Air Setting	Appliance			
								Input		Output	
			Kg/h	l/h				kW	Btu/hr	kW	Btu/hr
28 Sec. Kerosene	0.60 80°EH	110	1.87	2.37	215	10.5	6.0	22.5	77,000	20	68,000
28 Sec. Kerosene	0.75 80°EH	115	2.10	2.66	225	10.5	7.0	25	86,000	22.5	77,000
28 Sec. Kerosene	0.75 80°EH	135	2.34	2.96	240	11.5	7.5	28	96,000	25	85,000
35 Sec. Gas Oil*	0.60 80°S	130	2.13	2.51	225	11.0	7.25	25	86,000	22.5	77,000
35 Sec. Gas Oil*	0.60 80°S	160	2.37	2.79	240	11.5	8.0	28	96,000	25	85,000

20/25 Table 5. Electro Oil Inter B11C Burner (See Fig. 22) **RS Balanced Flue Appliance**

NOMINAL BOILER RATING AT NORMAL OPERATING TEMPERATURE											
Fuel	Nozzle ‡	Pump Pressure (p.s.i.)†	Fuel Flow Rate		Flue Gas Temp. (°C)**	%CO_2	Approx. Air Setting	Appliance			
								Input		Output	
			Kg/h	l/h				kW	Btu/hr	kW	Btu/hr
28 Sec. Kerosene	0.60 80°EH	110	1.87	2.37	215	10.5-11.0	6.0	22.5	77,000	20	68,000
28 Sec. Kerosene	0.75 80°EH	115	2.10	2.66	225	11.0-11.5	7.0	25	86,000	22.5	77,000
28 Sec. Kerosene	0.75 80°EH	135	2.34	2.96	240	11.5-12.0	7.5	28	96,000	25	85,000

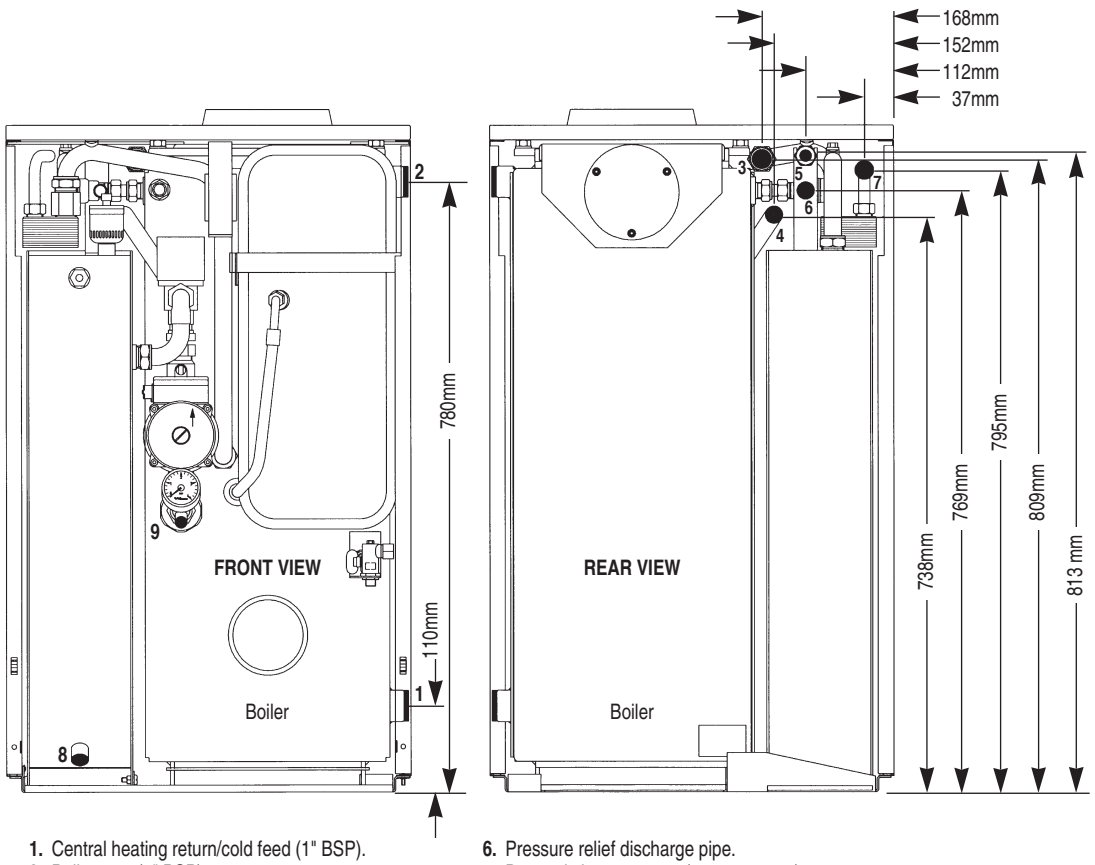
* **NOTE:** For use on conventional flue only.

** **NOTE:** The flue gas temperature is measured in the gas sampling hole on the flue outlet plate. The probe should be inserted to a depth of 50mm and angled towards the flue outlet. The temperature measured is not an absolute flue gas temperature and is for general guidance purposes only!

† **NOTE:** The pump pressure given is for general guidance only as variations in nozzle output can be up to ± 15%. It is, therefore, essential that the air is adjusted to give the correct CO_2 value.

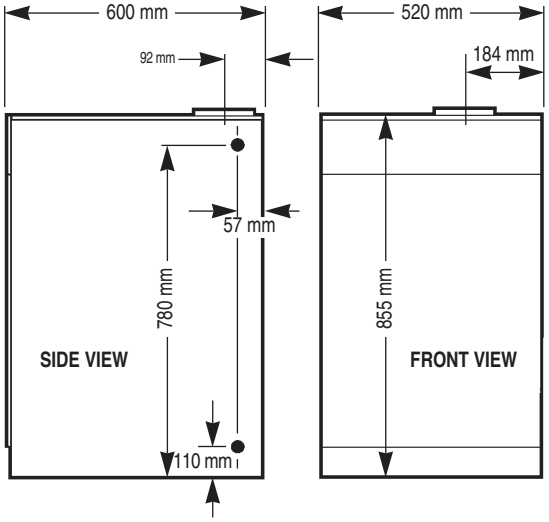
‡ **NOTE:** The nozzle type used on 28 Sec. Kerosene outputs are nozzles calibrated specifically for use with 28 Sec. Kerosene which gives less variation in nozzle output than the standard 35 Sec. Gas Oil nozzles. However, if a 28 Sec. Kerosene nozzle is not available at servicing or commissioning it is appropriate to install a 35 Sec. Gas Oil nozzle providing the output, spray angle and pattern of the nozzle is the same as the 28 Sec. Kerosene nozzle (e.g. 0.7580°EH may be replaced with a 0.7580°H).

Fig. 1. Pipework Dimensions.



1. Central heating return/cold feed (1" BSP).
2. Boiler vent (1" BSP).
3. Alternative central heating return tapping.
4. Central heating flow (22mm compression).
5. Mains cold water in (15mm compression).
6. Pressure relief discharge pipe.
7. Domestic hot water out (22mm copper).
8. Heatslave tank drain.
9. Pump manifold drain.

Fig. 2. Principal Dimensions.



4. Siting the Appliance

4.1 The appliance is not suitable for external installation unless a suitable enclosure is provided.

4.2. The appliance should be positioned on a non combustible solid base as near to the flue location point as possible. Care should be taken to ensure that the appliance is level; use packing at the corners where necessary.

4.3 When fitting a LLD or RS model, the rear of the appliance must be positioned against an external wall such that the flue terminal can safely discharge the flue gases as described in Section 7.

4.4. The following clearances must be left to allow access for installation and servicing:

- **(a)** Above - 300mm
- **(b)** In front - 600mm
- **(c)** Right and left hand side - sufficient for panel removal and access to pipe connections where required.

5. Removal of the Cabinet

See Figs. 3 and 4.

For installation and servicing of the appliance the cabinet panels should be removed as follows:

5.1. Remove the cabinet top panel by lifting squarely upwards to release the four ball stud connections.

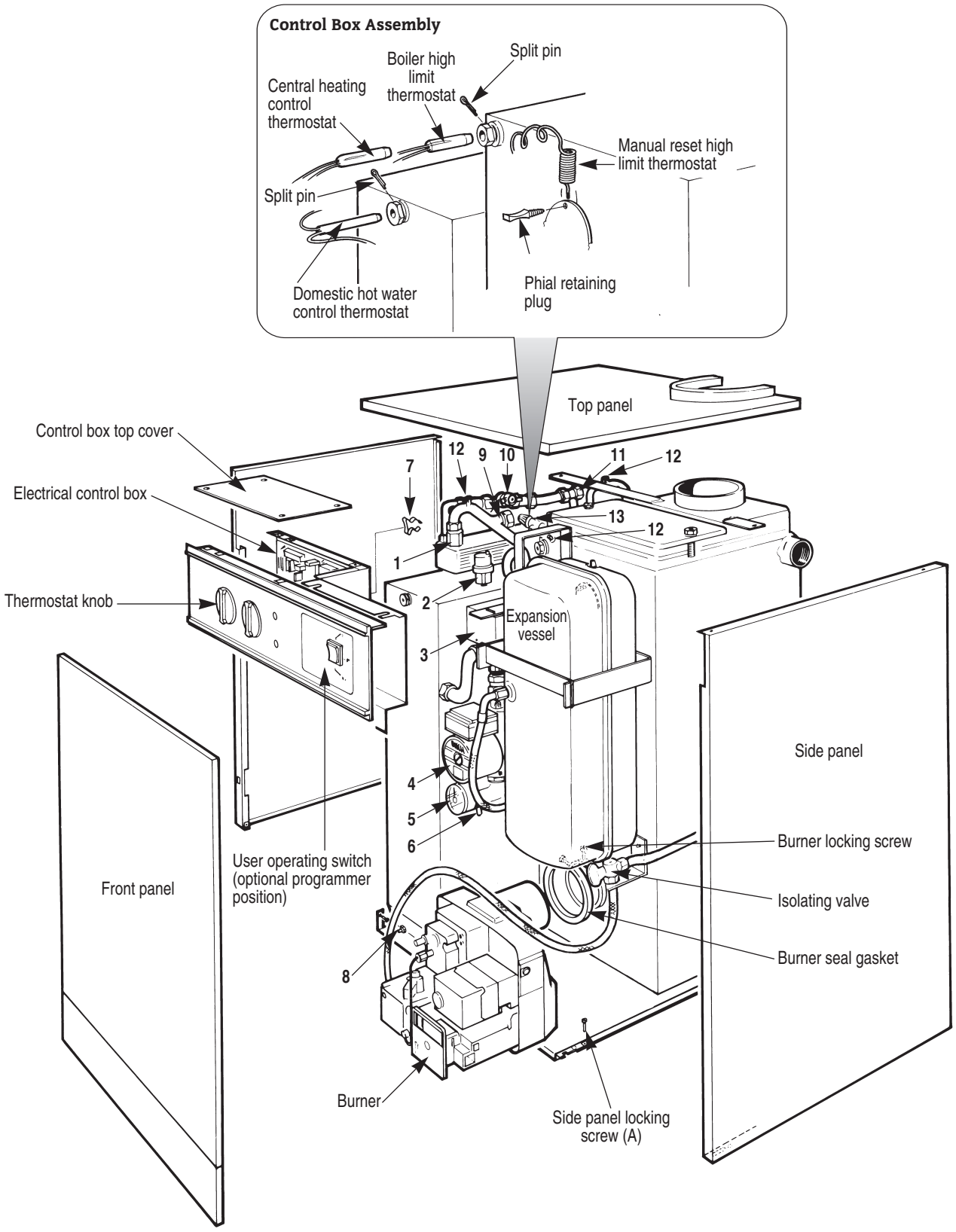
5.2. Remove the front panel by pulling the bottom of the panel forwards to release the ball studs and lifting the panel upwards and forwards to release it from its supporting ledge.

5.3. The side panels are removed by firstly following procedures 5.1 to 5.2 as described above, then remove screw (A) from the side panel base and the three screws located in the upper flange of each side panel. Ease the panel clear of the electrical control box and slide forwards to release from the locating lugs on the base plate.

5.4 The control box can be removed by undoing the four screws in the top access cover and then removing the wing nut on the underside of the control box. The thermostat phials should be carefully removed from the phial pocket, and the control box placed in a safe place taking care not to kink the thermostat capillary tubes.

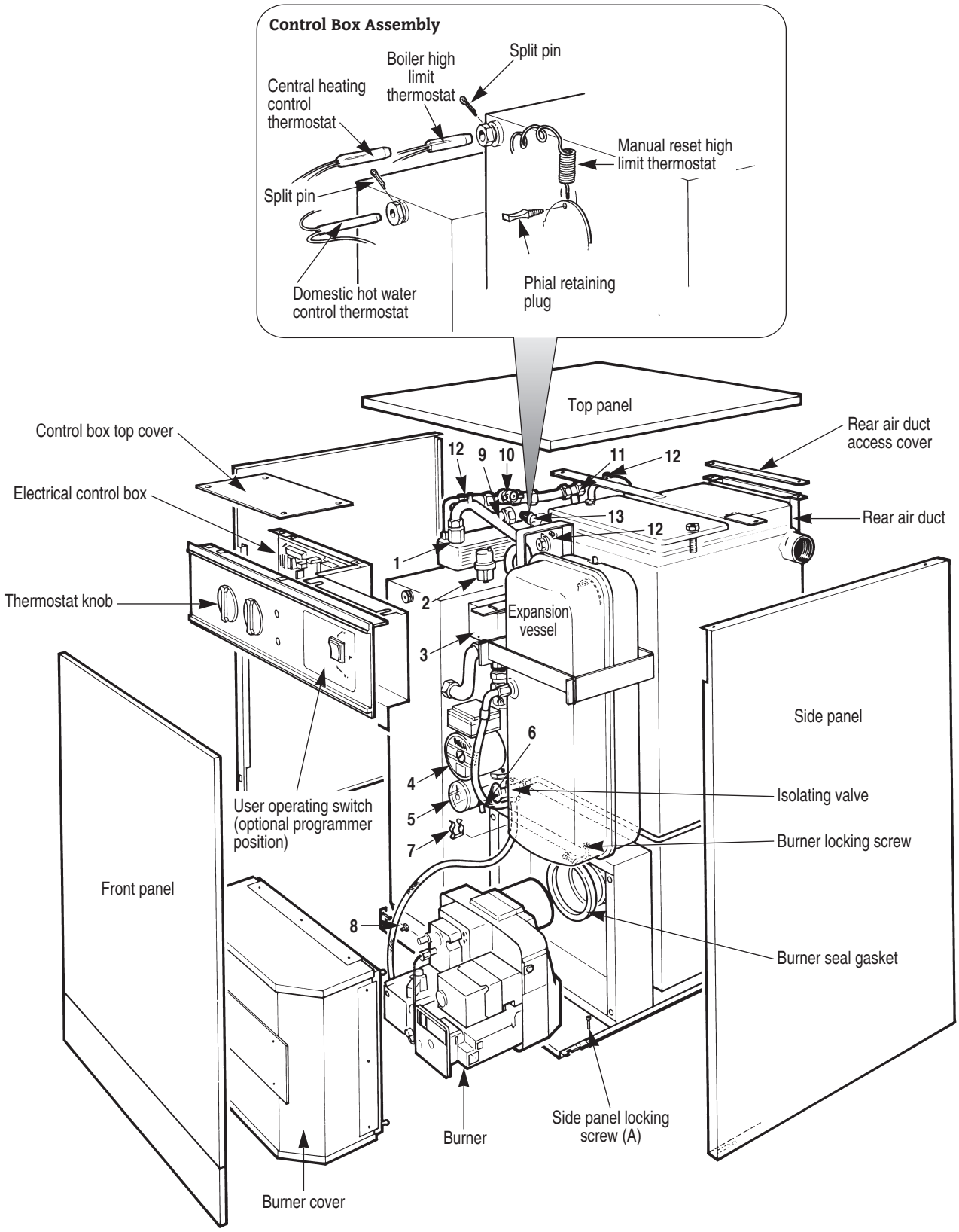
5.5 On the RS balanced flue model, remove the burner box cover by pulling forwards to release the ball studs. This will be found easier by pulling on one side of the handle first to release two ball studs and then repeating on the other side. Take care not to pivot the remaining two ball studs too far around as this will cause damage to the spring clips.

Fig.3. Conventional Flue Appliance (CF/LLD).



1. Hot water check valve.
2. Automatic air vent.
3. Diverter valve.
4. Pump.
5. System pressure gauge.
6. Pump manifold drain.
7. Fire valve clip.
8. Heatslave tank drain point (Unscrew ¾ turn to drain).
9. Alternative central heating return tapping.
10. Flow switch.
11. Mains cold inlet isolating valve.
12. Air vent.
13. Pressure relief valve.

Fig.4. Room Sealed Balanced Flue Appliance (RS).



1. Hot water check valve.
2. Automatic air vent.
3. Diverter valve.
4. Pump.
5. System pressure gauge.
6. Pump manifold drain.
7. Fire valve clip.
8. Heatslave tank drain point (Unscrew ¾ turn to drain).
9. Alternative central heating return tapping.
10. Flow switch.
11. Mains cold inlet isolating valve.
12. Air vent.
13. Pressure relief valve.

6. Air Supply

OPEN FLUE MODEL (CF/LLD)
This includes conventional flue and standard low level and high level horizontal discharge kits.
6.1 In order to ensure clean and efficient combustion, an adequate supply of air must be delivered to the combustion chamber. To provide sufficient air, a suitable inlet should be provided into the room or space in which the appliance is situated, the size of which is detailed in Table 6. An air brick or other form of continuous air supply may have to be built into the installation in order to ensure an adequate supply of air.
6.2 If the appliance is to be installed in a confined space or compartment, two air vents are required, one at high level and one at low level. The minimum free area of each vent is given in Table 7 and depends whether the air is taken from another room or from outside the building. Where the air is taken from another room that room must contain an air inlet as described in 6.1.
6.3 There must be sufficient clearance around the appliance to allow proper circulation of ventilation air. The clearances required for installation and servicing will normally be adequate for ventilation. See Section 4.4.

ROOM SEALED BALANCED FLUE MODEL (RS)
6.4 The appliance does not require a separate vent for combustion air.
6.5 Installation in cupboards or compartments require permanent vents for cooling purposes, one at high level and one at low level, either direct to outside air or to a room. Both vents must pass to the same room or be on the same wall to the outside wall to the outside air. The minimum air vent free area is given in Table 8.
6.6 There must be sufficient clearance around the appliance to allow proper circulation of ventilation air. The clearances required for installation and servicing will normally be adequate for ventilation. See Section 4.4.

Table 6. Minimum Combustion Air Inlet Free Area for Open Flue appliances

APPLIANCE	AREA OF AIR INLET	
	cm²	in.²
12/14	77	12
15/19	105	16.5
20/25	138	21.5

Table 7. Minimum Air Vent Free Area for Open Flue appliances installed in a compartment.

Appliance model	Ventilation to room or internal space		Ventilation to outside	
	High Level	Low Level	High Level	Low Level
12/14	154cm²	231cm²	77cm²	154cm²
15/19	209cm²	314cm²	105cm²	209cm²
20/25	275cm²	413cm²	138cm²	275cm²

Table 8. Minimum Air Vent Free Area for Room Sealed appliances installed in a compartment.

Appliance model	Ventilation to room or internal space		Ventilation to outside	
	High Level	Low Level	High Level	Low Level
12/14	154cm²	154cm²	77cm²	77cm²
15/19	209cm²	209cm²	105cm²	105cm²
20/25	275cm²	275cm²	138cm²	138cm²

7. Flue System

A flue system must be provided in accordance with BS5410: Part 1 and the Building Regulations, part J, Section J2.
7.1 Conventional Flue (CF). See Fig 5.
Conventional Flue Diameters: 12/14 – 100mm (4in.)
15/19 – 100mm (4in.)
20/25 – 100mm (4in.)
The boiler is fitted with a conventional flue locating spigot. The flue pipe fits into the spigot and should be correctly sealed with fire cement.
NOTE: The flue size must never be reduced from the take-off diameter. An increase in flue size is permissible provided that the joint is sealed correctly.

Fig. 5. Flue Installation.

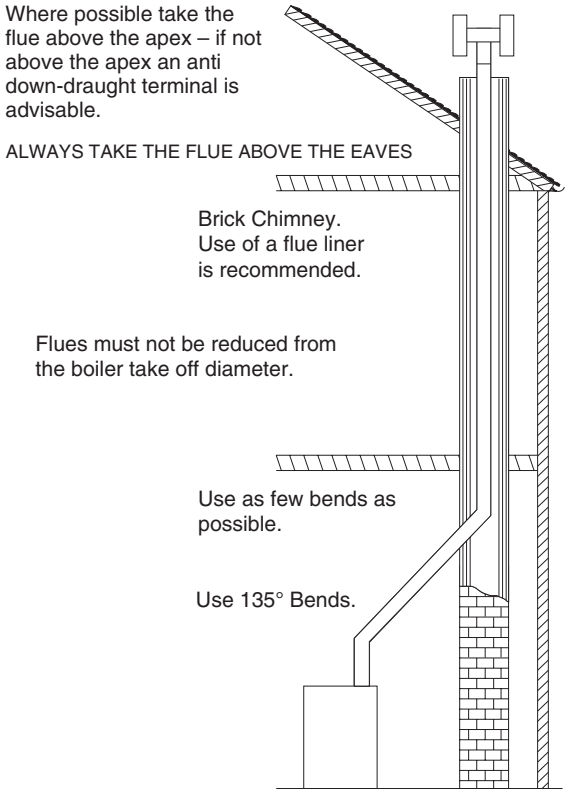

Where possible take the flue above the apex – if not above the apex an anti down-draught terminal is advisable.
ALWAYS TAKE THE FLUE ABOVE THE EAVES
Brick Chimney. Use of a flue liner is recommended.
Flues must not be reduced from the boiler take off diameter.
Use as few bends as possible.
Use 135° Bends.

Fig. 6. Flue Installation (Rear Discharge).

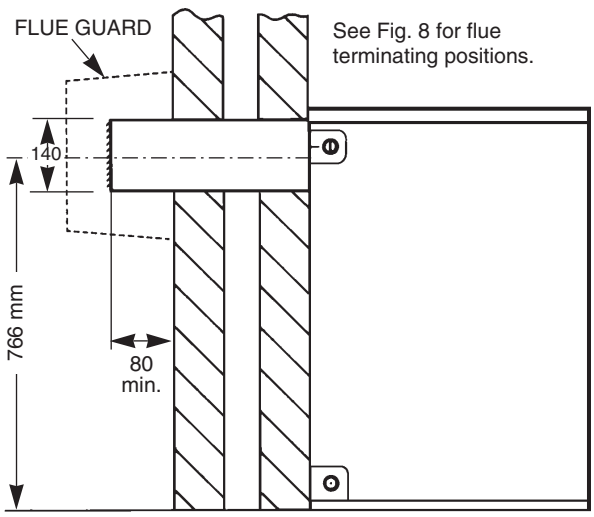
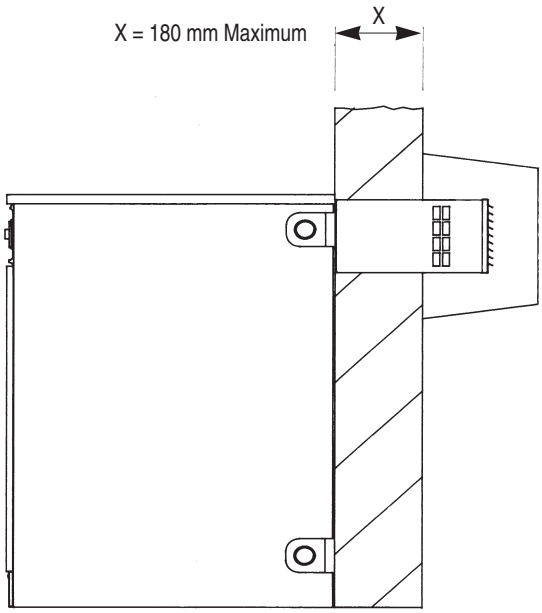
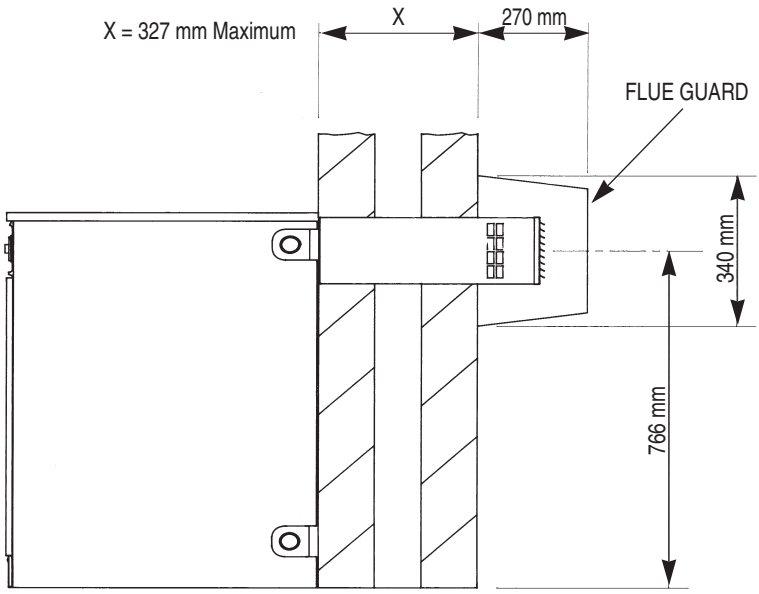


Fig. 7. Room Sealed Balanced Flue Terminal Installation.



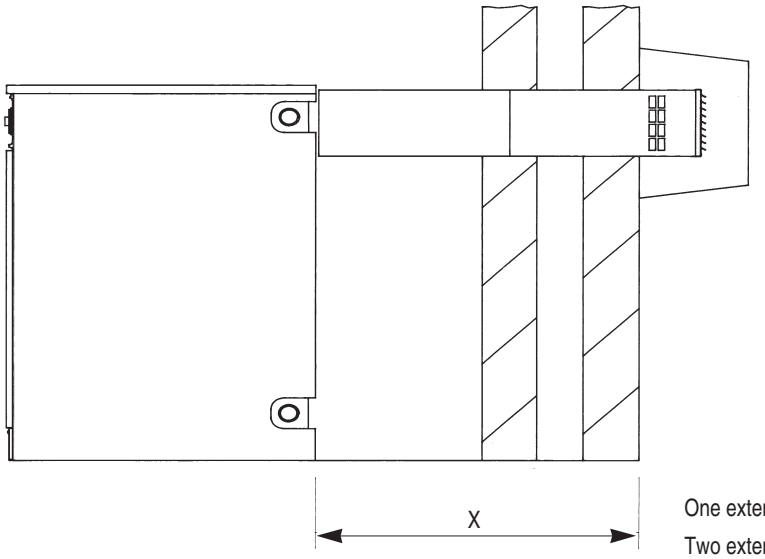
(a) Rear Discharge 4" to 7" Single Skin Wall.

For use with non-standard/single skin walls up to 182 mm thick.
Where noise emission from the flue terminal is likely to be of concern, it is recommended that the standard 12 in. terminal is used and the appliance stood away from the wall to take up the extra terminal body length.



(b) Rear Discharge 7" to 12" Wall.

For use in standard cavity walls and solid walls up to 327 mm thick. This terminal offers maximum noise reduction of the flue gases. This terminal is designed for use with the extension kit.



(c) Rear Discharge Extension Kit 12" to 36" Wall.

For use where the wall thickness exceeds 327 mm or where the appliance is to be stood away from the wall as shown. The system uses a standard 12 in. RS Flue Terminal and up to two extension kits, which simply bolt together.

One extension kit – X = 638 mm Maximum

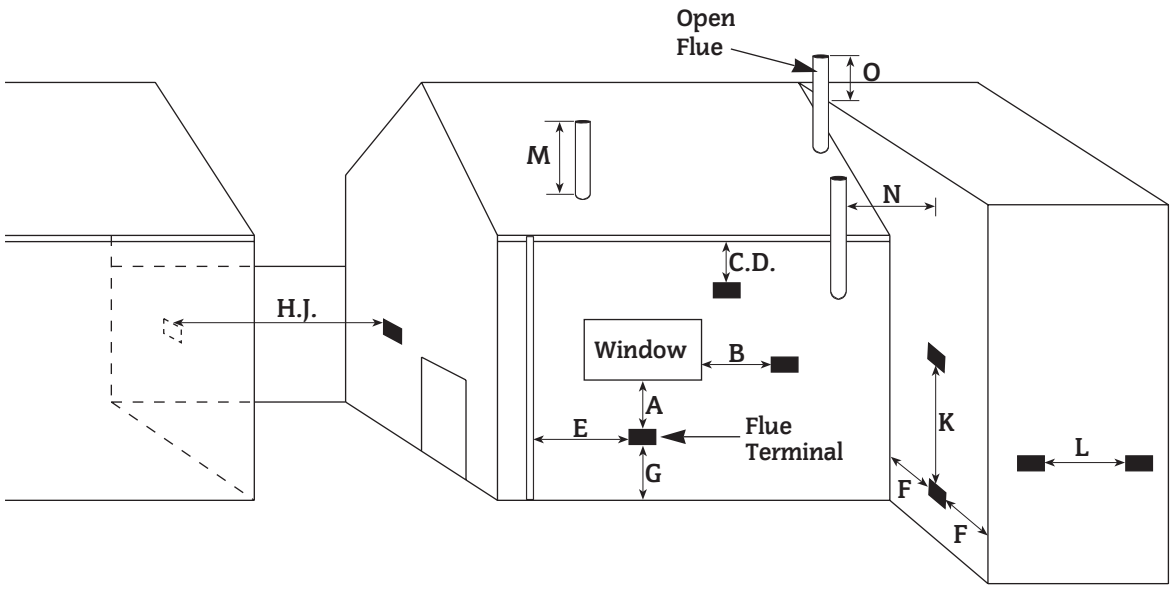
Two extension kits – X = 952 mm Maximum

The flue should be vertical and contain as few bends as possible. Where bends are necessary, a maximum of two are permitted and 135° bends should be used.
All brick and masonry chimneys should be lined with a suitable non-combustible material. They must be properly jointed and able to withstand the effects of the working temperature of the appliance and any condensate which may form.
Down-draught conditions will adversely affect the operation of the appliance and must be avoided. Where possible, the flue should be extended beyond the apex of the roof and should always be taken beyond the eaves of the building. Where down-draught is experienced a suitable anti-down-draught terminal should be fitted to the flue termination.
The natural flue draught must be checked. A suitable location for checking this is located in the flue outlet plate on top of the boiler. The draught should be no less than 0.75mm w.g and no greater than 5.1mm w.g. If a flue draught greater than 5.1 mm w.g is experienced a draught stabiliser should be fitted to the flue and adjusted to achieve a flue draught within the specified range.

7.2 Low Level Discharge (LLD)
See Fig 6.
The conventional flue appliance may be converted to discharge the products of combustion at low level. For this purpose a special flueless kit and associated ducting is available, allowing the conventional flue to be discarded. Detailed instructions for converting the appliance to low level discharge are supplied with the conversion kit. The flue spigot should be removed from the flue outlet plate by undoing the three retaining screws and the hole blanked off with the plate provided in the kit.
NOTE: Under no circumstances may 35 Second Gas Oil be burned with this type of flue terminal arrangement.
7.3 Room Sealed Balance Flue Model (RS)
The appliance is supplied ready for installation as a low level discharge balanced flue system by the simple addition of one of the flue terminal options shown in Fig.7.
Details of the installation procedure are included in the Flue Terminal Installation Instructions supplied with the terminal kit.
Alternatively, a range of room sealed balanced flue kits are available to convert the appliance to discharge the flue products to the left, right, at a higher level, or vertically up to a roof height of 4.5 metres.

Fig. 8. Flue terminating positions for oil-fired appliances

NOTE: The dimensions given are for general guidance only. Other surrounding buildings or objects may affect the clearance of combustion products. An alternative flue terminal position should be sought when there is any possibility of a nuisance being caused by inadequate dispersal of flue products.
Terminals should be positioned so as to avoid products of combustion entering into buildings.



	Terminal Position	Minimum Distance (mm) Open Flue	Low-Level Discharge
A	Directly below an opening, air brick, window, etc.	Not allowed	600
B	Horizontally to an opening, air brick, window, etc.	Not allowed	600
C	Below a gutter or sanitary pipe	Not allowed	75
D	Below eaves or a balcony	Not allowed	600
E	From vertical sanitary pipework	Not allowed	75
F	From an internal or external corner	Not allowed	300
G	Above ground or balcony level	Not allowed	300
H	From a surface facing the terminal	Not allowed	600
J	From a terminal facing the terminal	Not allowed	1200
K	Vertically from a terminal on the same wall	Not allowed	1500
L	Horizontally from a terminal on the same wall	Not allowed	300
M	Above an intersection with the roof	600	Not applicable
N	From a vertical structure on the side of the terminal	600	Not applicable
O	Above a vertical structure less than 750 mm from the side of the terminal	600	Not applicable

7.4 Siting the flue terminal

1. The flue terminal must be located in a suitable position, as shown in Fig 8, such that products of combustion can be freely dispersed without the possibility of flue gases entering dwelling or that of a neighbouring dwelling.

2. Discharge of flue gases into carports or narrow passageways is not recommended.

3. The terminal must not cause obstruction nor the discharge cause a nuisance as a result of either flue gases or terminal noise.

4. If the terminal is fitted within 1 m of a plastic or painted gutter or within 500 mm of painted eaves then an aluminium or stainless steel shield at least 1 m long should be fitted to protect the surface.

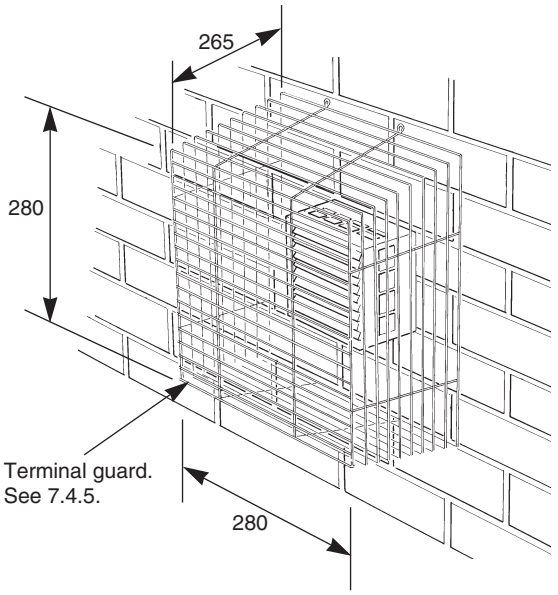
5. If a terminal is fitted less than 2 metres above a surface to which people have access, fit a terminal guard as shown in Fig 9. A suitable guard is available from Worcester Heat Systems, Part number 7 716 190 009, or alternatively a proprietary terminal guard may be used provided it has the minimum dimensions shown in Fig 9. The guard should have suitable corrosion resistance due to the acidic content of the flue gases.

6. The terminal guard must be evenly spaced about the flue terminal and secured using screws, to allow access to the flue terminal.

7. In certain weather conditions a terminal may steam and siting where this could cause a nuisance should be avoided .

8. Take care to ensure that combustion products do not enter ventilated roof voids.

Fig. 9. Terminal guard Minimum dimensions.



8. Oil Supply

(See Figs. 10, 11 and 12).

8.1 The oil storage tank must be installed in accordance with BS799: part 5. The tank should be arranged with a slope of 1 in 24 away from the outlet valve with a sludge cock at its lower end.

8.2 Do not use galvanised steel tanks or pipework for the oil supply system.

8.3 Do not use soldered joints in the oil supply pipework as this could cause a hazard in the case of a fire.

8.4 The burners on all appliances are supplied so as to be connected to a single pipe gravity feed system. Details of how to convert the burners to a double pipe sub-gravity feed system are shown in Fig. 10

8.5 If a single pipe system is employed, then the tank must be positioned such that the oil level does not exceed 4 metres above the level of the burner oil pump and in addition the oil level must be at least 0.3 metres above the level of the oil pump. Should it prove impossible to site the tank below the 4 metres maximum oil level head breaking device must be installed between the tank and the burner.

8.6 If a double pipe system is used then the maximum suction height allowable is 3.5 metres.

8.7 The oil supply pipe diameter can be determined using Tables 9 and 10 depending on whether a single or double pipe system is being installed. Selection of the correct pipe diameter will depend on the position of the oil storage tank relative to the burner and the length of pipe run.

8.8 The oil supply pipe should be laid as level as possible to avoid air pockets and unnecessary friction losses.

8.9 The following components should be fitted in the fuel line between the storage tank and burner.

1. A Manual isolating valve installed as close to the tank as possible.

2. A fire valve in accordance with BS799, Part 2 as shown in Fig 11. The fire valve should be fitted externally with a fire detection element located within the appliance case. Use of a capillary type valve will allow a neat and simple installation. A suitable valve is the KBB manufactured by Teddington Controls Limited. A spring clip has been provided behind the electrical panel on CF/LLD models, shown in Fig 3, and on the burner box on RS models, shown in Fig 4, to allow a fire valve element to be mounted. Alternatively a fusible link or electrical system may be used. Under no circumstances should a combination isolating/fire valve be used as the sole fire protection device.

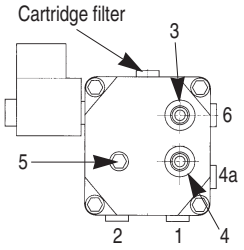
3. A paper element filter complying with the requirements of BS799, Parts 2, 3 and 4 should be fitted in the fuel line between the fire valve and the isolating valve but not within the appliance casing.

TABLE 9 Single Pipe Gravity Feed System

HEAD (metres)	MAXIMUM ALLOWABLE PIPE RUN (metres)	
	8 mm inside dia. pipe (10 mm O.D. copper)	10 mm inside dia. pipe (12 mm O.D. copper)
0.5	10	20
1.0	20	40
1.5	40	80
2.0	60	100

Fig. 10. Oil Pump.

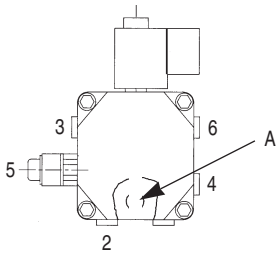
A. Danfoss BFP 41.



1 INLET
2 RETURN
3 BLEED AND PRESSURE GAUGE PORT
4 VACUUM GAUGE PORT
5 PRESSURE ADJUSTMENT
6 NOZZLE OUTLET

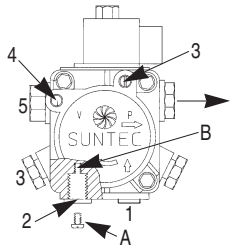
To convert to a double pipe system, remove plug 4a and insert the grub screw provided into the threaded hole. Connect flow and return pipes to (1) and (2).

B. Danfoss BFP 11 Oil Pump.



To convert to a double pipe system: Remove the pump front cover, remove the changeover screw (A) nearest to ports 1 and 2, and the horseshoe washer underneath. Replace the changeover screw back into the threaded hole. Connect the flow and return pipes to 1 and 2.
Note: When removing the pump front cover ensure that a suitable receptacle is placed below the pump to catch the oil residue.

C. Suntec AS47C Oil Pump.



To convert to a double pipe system, remove the return port plug (2) and insert the grub screw (A) provided into the threaded hole (B). Connect flow and return pipes to (1) and (2).

TABLE 10 Double Pipe Sub-Gravity Feed System

HEAD (metres)	MAXIMUM ALLOWABLE PIPE RUN (metres)	
	8 mm inside dia. pipe (10 mm O.D. copper)	10 mm inside dia. pipe (12 mm O.D. copper)
0	35	100
0.5	30	100
1.0	25	100
1.5	20	85
2.0	15	70
2.5	11	50
3.0	8	30
3.5	6	20

Fig. 11. Oil Supply.

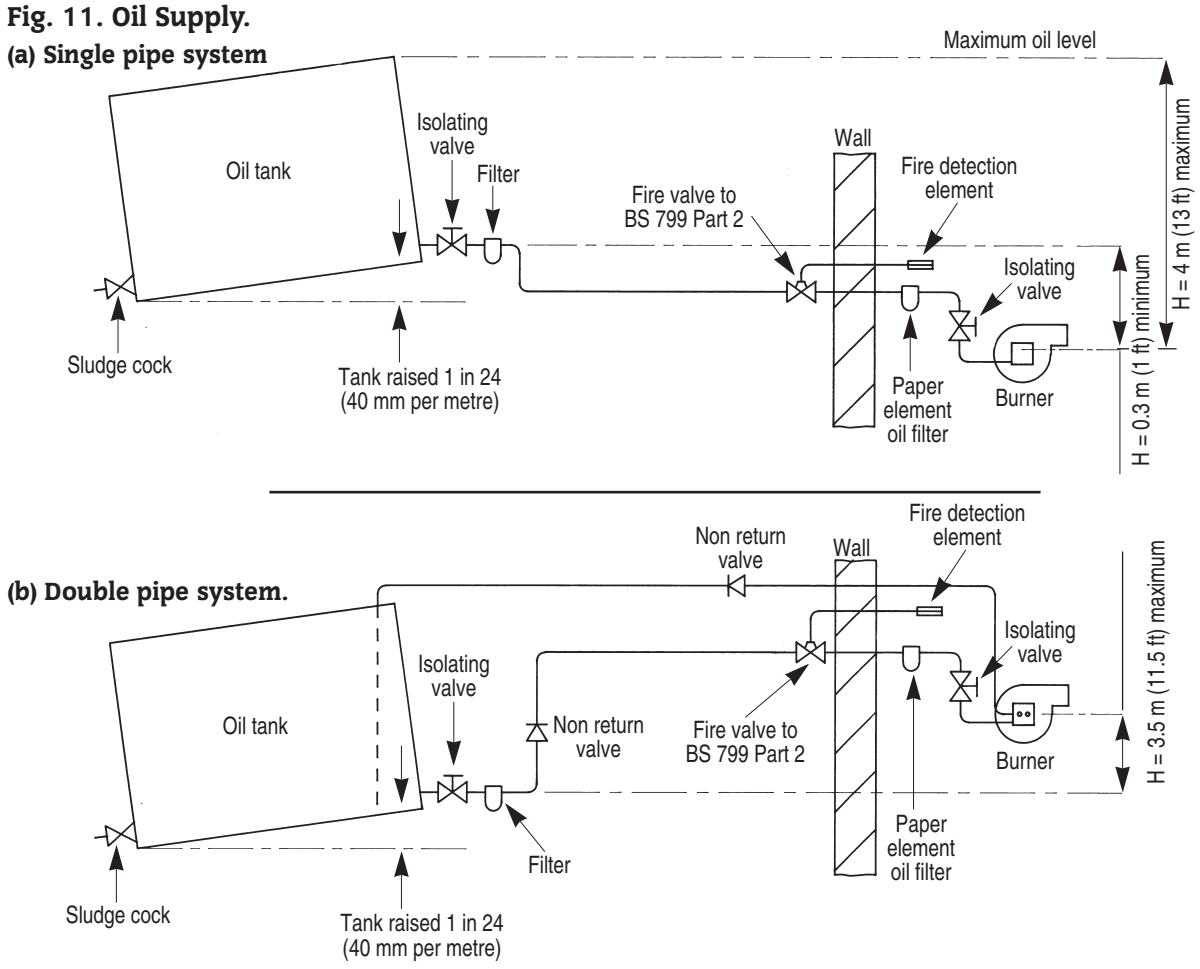
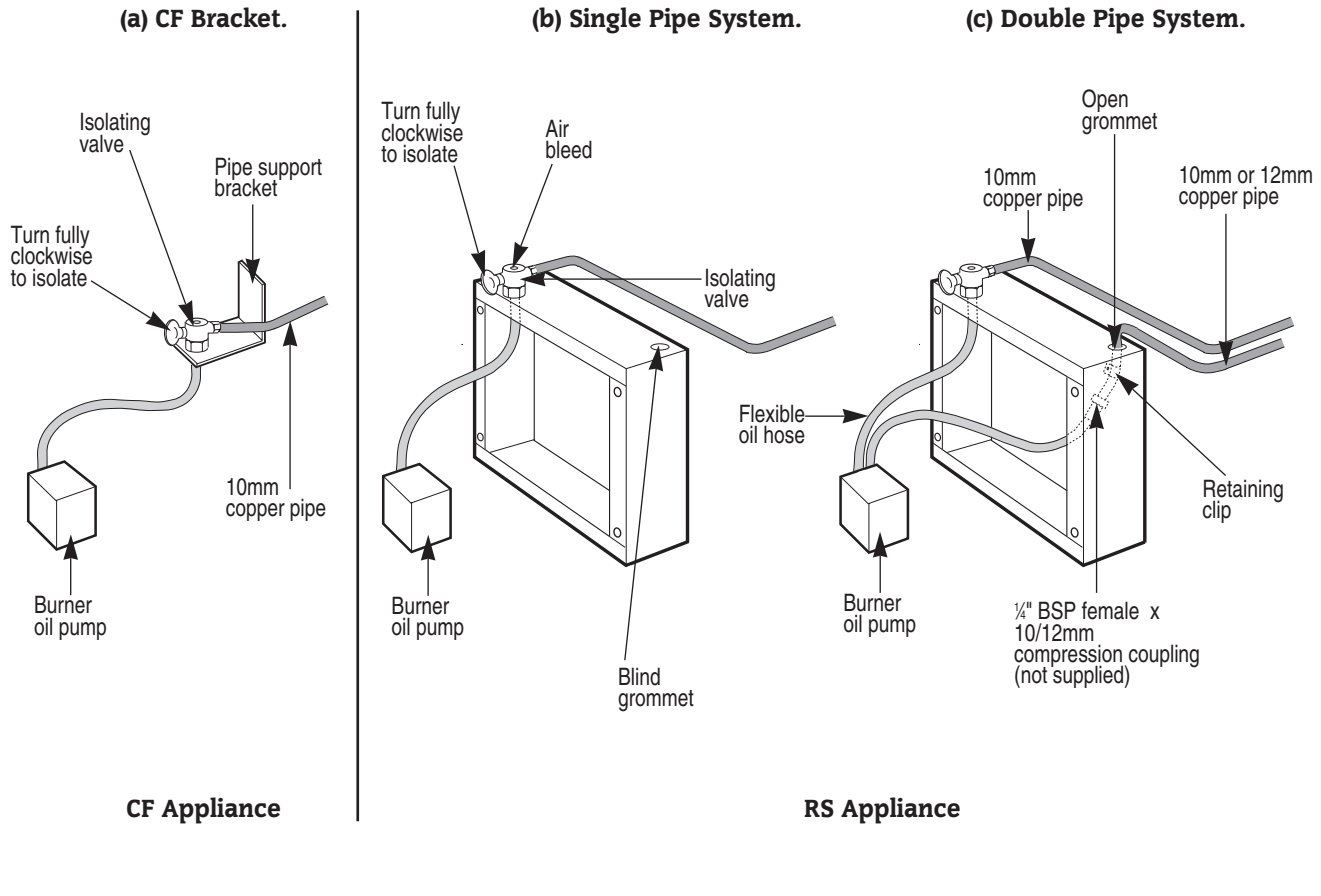


Fig. 12. Oil Pipe Installation.



9. System Considerations

9.1 The appliance incorporates a circulating pump. No other pump is required. The appliance will operate satisfactorily on a two-pipe small bore or micro bore system using thermostatically controlled radiator valves.
9.2 The appliance incorporates a three-port, two-way diverter valve which diverts the boiler output to the Heatslave tank in response to a demand from the Domestic Hot Water Control Thermostat or the flow switch. The valve is powered open in response to a demand from the Central Heating Control Thermostat or a room thermostat, and the boiler output is diverted to the heating circuit.
If there is a demand from both the Heatslave tank and the central heating, the valve will give priority to the Heatslave tank. The central heating will therefore remain switched off for a short period of time. This delay will vary depending on the appliance output and the quantity of energy required to satisfy the domestic hot water demand.
The Heatslave tank priority can be temporarily overridden to regain the central heating output by turning the Domestic Hot Water Thermostat fully anti-clockwise for the duration of the warm up period. This will prevent the Heatslave tank taking priority for the tank warm up period of approximately 20 minutes and may be found advantageous to give quicker heating to the dwelling when starting from cold.
9.3 A check valve is incorporated in the hot water primary circuit to prevent gravity circulation from the tank to the boiler.
9.4 When employing a central heating system where primary water flow may be prevented during a pump overrun situation (e.g. by using thermostatic radiator valves on all radiators), a bypass valve should be fitted between the flow and return pipes.
9.5 The pressure jet burner fitted to the appliance has full automatic control and there is no requirement for heat leak radiators.
9.6 It is strongly recommended that isolating valves are fitted to the central heating flow and return pipes. This will allow the boiler and Heatslave tank to be drained for service work without having to drain down the whole central heating circuit.
9.7 A drain point should be provided in the domestic hot water pipework at any point below the height of the domestic hot water heat exchanger.
9.8 Provision should be made to allow air to be vented from the domestic hot water pipework at any high points. Failure to vent the air will cause the flow switch to operate momentarily if a cold water tap is turned off rapidly.
9.9 Any unused boiler tappings should be plugged prior to filling.
9.10 The primary central heating system should be flushed and treated in accordance with recommendations of BS 7593: 1992 before the system is handed over to the user.

10. Sealed Primary System

See Figs. 13 and 14.
10.1 The system must comply with the requirements of BS 7074:1 and BS 5449:1.
10.2 A manual reset overheat thermostat is located on the underside of the electrical panel and is accessible by removing the cabinet front panel. If a boiler overheat condition arises the burner will remain inoperative until the thermostat button is reset. See Fig. 3 and 4.
10.3 The pressure relief valve operates at 3 bar (45 lb/in^2). The discharge must be directed away from the electrical components or where it might be a hazard to the user.
10.4 The pressure gauge, located in the pipe below the pump, indicates the system pressure which must be maintained.
10.5 The 12 litre expansion vessel is charged to 0.5 bar and is suitable for a static head of 5 metres (17.5 ft). The pressure can be increased for a static head greater than 5 metres (17.5 ft).
10.6 With an initial system pressure of 0.5 bar, a system capacity of about 180 litres can be accommodated. Refer to BS 7074 Pt 1 for more information.

Fig. 13. Sealed Primary System.

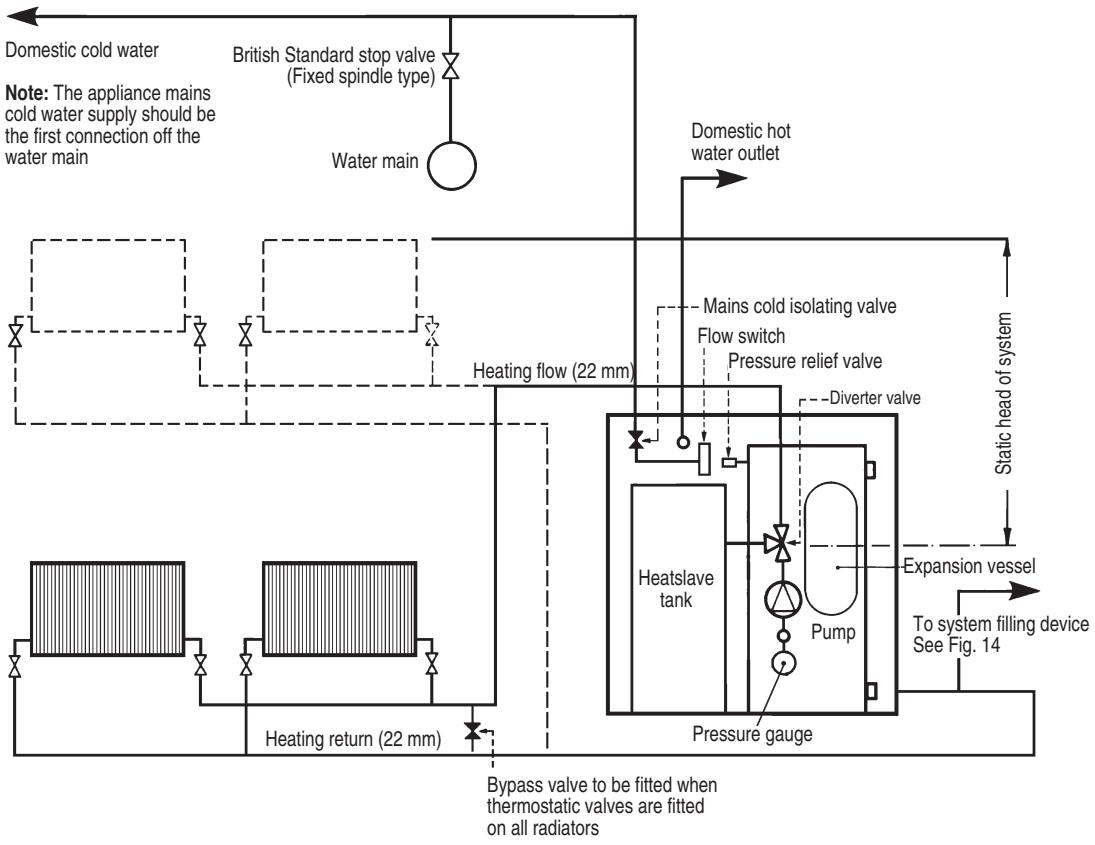
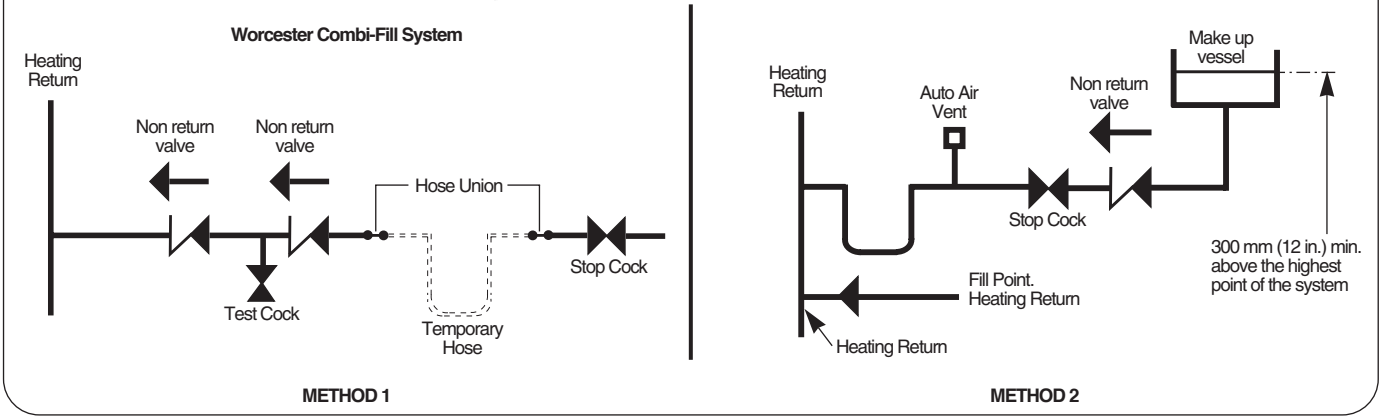

Domestic cold water
British Standard stop valve (Fixed spindle type)
Note: The appliance mains cold water supply should be the first connection off the water main
Water main
Domestic hot water outlet
Mains cold isolating valve
Flow switch
Pressure relief valve
Diverter valve
Heating flow (22 mm)
Static head of system
Heatslave tank
Pump
Expansion vessel
To system filling device See Fig. 14
Pressure gauge
Heating return (22 mm)
Bypass valve to be fitted when thermostatic valves are fitted on all radiators

Fig. 14. System Filling and Make-Up.



Where the system volume exceeds the value given in Table 11 an additional expansion vessel, of suitable volume, should be fitted to the heating return pipework as close to the boiler as possible.

NOTE: The values given in Table 11 are the total system volumes. The primary water capacity given in Table 1 should be deducted from the total system volume when calculating the volume for radiators, pipework etc.

10.7 The method of filling the appliance can be either method 1 or 2 shown in Fig 14. The filling point must be at low level and must never be a permanent direct fixing to the mains water supply.

10.8 Water loss must be replaced, see Fig 14. The connection should be made to the central heating return pipe as close to the appliance as possible.

10.9 The make-up vessel, where used, must be fitted with a non-return valve.

10.10 Repeated venting loses water from the system. It is essential that this water is replaced and the system pressure maintained.

10.11 Connections to the mains water supply must not be made without the authority of the local Water Company.

10.12 The appliance incorporates a circulating pump. No other circulating pump is required. The pump is factory set to the maximum setting (No: 3) and should not be altered as this would affect the domestic hot water performance.

10.13 Connections in the system must resist a pressure of up to 3 bar.

10.14 Radiator valves must conform to BS 2767 (10): 1972.

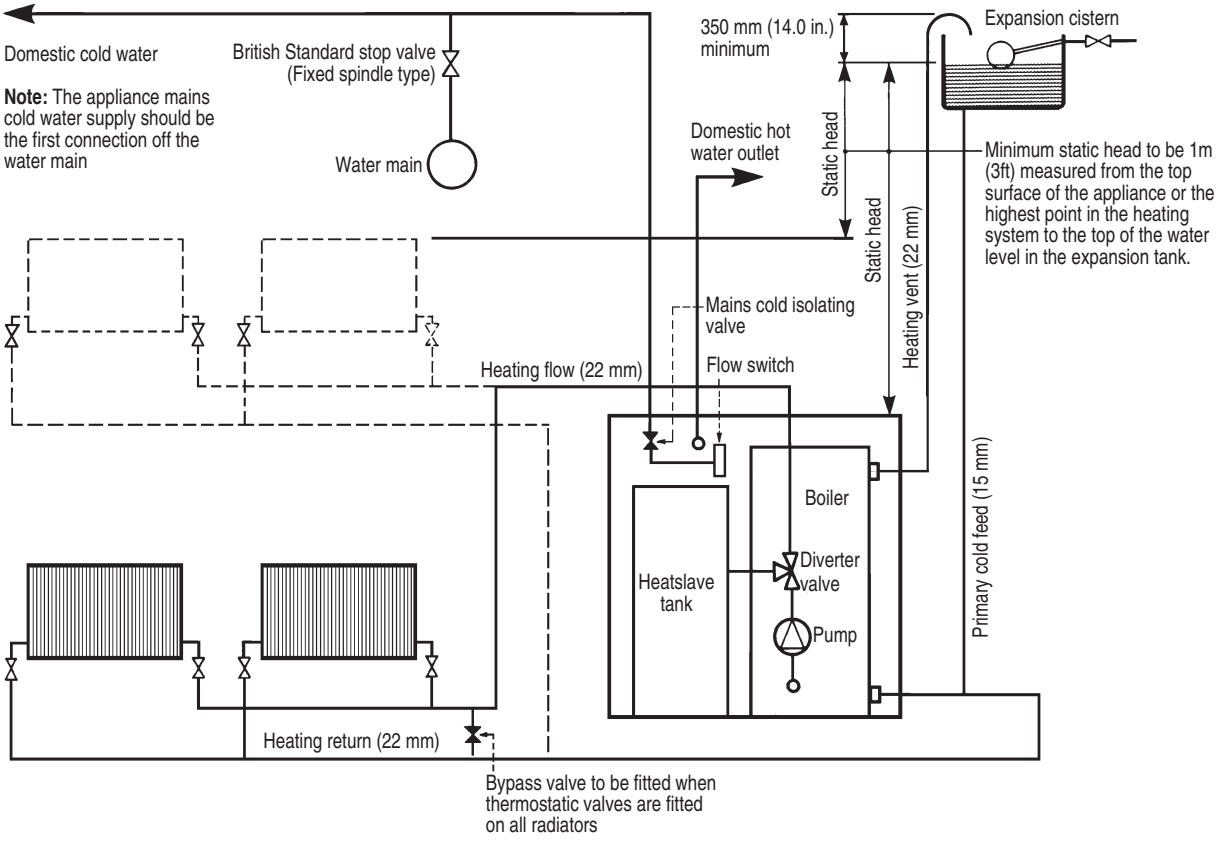
10.15 Other valves used should conform to the requirements of BS 1010.

11. Open Vent Primary System

See Fig 15.

The appliance is supplied ready for connection to a Sealed Water system. Where the appliance is to be used with an Open Vent System, the pressure relief valve may be removed and the tapping blanked off. If the relief valve is left in position, a discharge pipe should be fitted. The pipe must be directed away from the electrical components or where it might be a hazard to the user.

Fig. 15. Open Vent Primary System.


Domestic cold water
British Standard stop valve (Fixed spindle type)
Note: The appliance mains cold water supply should be the first connection off the water main
Water main
350 mm (14.0 in.) minimum
Expansion cistern
Domestic hot water outlet
Static head
Static head
Heating vent (22 mm)
Minimum static head to be 1m (3ft) measured from the top surface of the appliance or the highest point in the heating system to the top of the water level in the expansion tank.
Mains cold isolating valve
Flow switch
Heating flow (22 mm)
Boiler
Diverter valve
Heatslave tank
Pump
Primary cold feed (15 mm)
Heating return (22 mm)
Bypass valve to be fitted when thermostatic valves are fitted on all radiators

The following points are for guidance only. The system installation should be carried out in accordance with BS 5449. Part 1.

11.1 The feed and expansion pipes must rise continuously from the appliance. The feed pipe must be at least 15mm diameter and the expansion pipe must be at least 22mm diameter. If access to the 1" BSP sockets on the right hand side of the boiler is difficult, use the alternative return connection on the boiler pipework. See Figs. 3 and 4.

The cistern must be arranged to provide a minimum static head of 1 metre (3 ft) above the top of the appliance casing or the highest point in the heating circuit. See Fig 15.

11.2 Air in the appliance is expelled through the vent pipe or dissipated into the system, but manual air vents should be fitted at high points in the system. An automatic air vent is fitted to the Heatslave tank and manual air vents are included on high points in the appliance pipework.

11.3 The appliance incorporates a circulating pump. No other circulating pump is required. The pump is factory set to the maximum setting (No: 3) and should not be altered as this would affect the domestic hot water performance.

TABLE 11

TOTAL SYSTEM VOLUME (Litres)			
Initial System Pressure (bar)	Initial Charge Pressure (bar)		
	0.5	1.0	1.5
0.5	180	–	–
1.0	107	138	

12. Domestic Hot Water

The following are general requirements and, if necessary, reference should be made to the local Water Company before fitting the appliance.

12.1 Mains Cold Water Inlet

Devices capable of preventing the flow of expansion water must not be fitted unless separate arrangements have been made. An expansion vessel can be fitted within the casing of the appliance if necessary.

The final 600mm of the mains cold water connection to the appliance should be made in copper tube only.

The appliance is suitable for a mains cold water supply having a maximum pressure of up to 10 bar (145 lb/in^2). A pressure reducing valve must be fitted if the mains pressure exceeds 10 bar.

12.2 Domestic Hot Water Supply and Flow Regulation

As with all mains fed systems, the flow rate of water obtainable from individual taps will vary in relation to the number of outlets operated simultaneously.

The flow rate will depend on the cold mains supply pressure available to the property and the diameter and length of pipework making up the domestic water distribution system.

When more than one outlet is used at once, starvation of water flow may occur at one or more outlets. Where this is a problem flow balancing valves or Ball-O-Fix valves should be installed at the appropriate outlets.

The 12/14 and 15/19 appliances are fitted with a water flow restrictor. The maximum flow of domestic hot water available from the appliances is 15 litres/min (+ or - 15%) (3.3 gallons/min) and requires a minimum mains cold supply pressure of 1.6 bar (22 lb/in^2) to attain this level.

The 20/25 appliance is not fitted with a flow restrictor and therefore the flow rate is only limited by the water supply pressure. This can be manually adjusted at the mains cold water inlet isolating valve. The maximum recommended domestic hot water flow rate from this appliance is 17 litres/min (3.7 gallons/min).

The temperature of hot water drawn will vary with the flow rate at the taps and the appliance operating temperatures. It is usual that flow rates (and thus temperatures) are controlled at the tap, but if a more permanent setting is required, a mixing valve can be fitted.

If there are long pipe runs to the taps or shower, it is suggested that they be insulated to prevent the rapid cooling of residual hot water in the pipes after the tap has been turned off.

NOTE: The flow restrictor contained within the flow switch housing is plastic. Do not allow the housing to become hot during soldering operations.

12.3 Taps and Valves

Hot and cold taps and mixing valves used with this appliance must be suitable for operating at a mains pressure of up to 10 bar (145 lb/in^2).

12.4 Showers (Fixed Head Type)

No anti-syphonage arrangements are necessary. Thermostatically controlled shower valves will give extra comfort and guard against the flow of water at too high a temperature.

12.5 Showers (Loose or Flexible Head Type)

A loose head shower hose must be fixed so that the head cannot fall closer than 25mm (1 in) above the top edge of the bath to prevent its immersion in bath water. Alternatively the shower must incorporate or be fitted with an anti-syphonage device at the point of the flexible hose connections.

Thermostatically controlled shower valves will give extra comfort and guard against the flow of water at too high a temperature.

12.6 Bidets

The supply of hot and cold mains water direct to a bidet is permitted (subject to local Water Company requirements) provided that the bidet is of the over-rim flushing type. The outlet(s) should be shrouded and unable to have any temporary hand held spray attached. No anti-syphonage arrangements are necessary.

12.7 Use in Hard Water Areas

In areas of exceptionally hard water supply, it is recommended that an In-line scale inhibitor be fitted.

Installation should be strictly in accordance with the requirements of the local Water Company. An isolating valve to facilitate servicing should be incorporated.

The water hardness may be determined using the standard test paper or by reference to the local Water Company.

Further information may be obtained from Worcester Heat Systems Ltd.

13. Electrical

Refer to Figs. 16, 17, 18 and 19.

13.1 The wiring between the appliance and the electrical supply shall comply with current IEE Wiring Regulations and any local regulations which apply.

13.2 To gain access to the mains connection point on the control board.

1. Isolate the mains electrical supply.

2. Remove the cabinet top panel by snatching squarely upwards.

3. Release the four screws securing the cover of the electrical control box.

13.3 Mains Supply

Mains Supply-230/240V ~ 50 Hz.

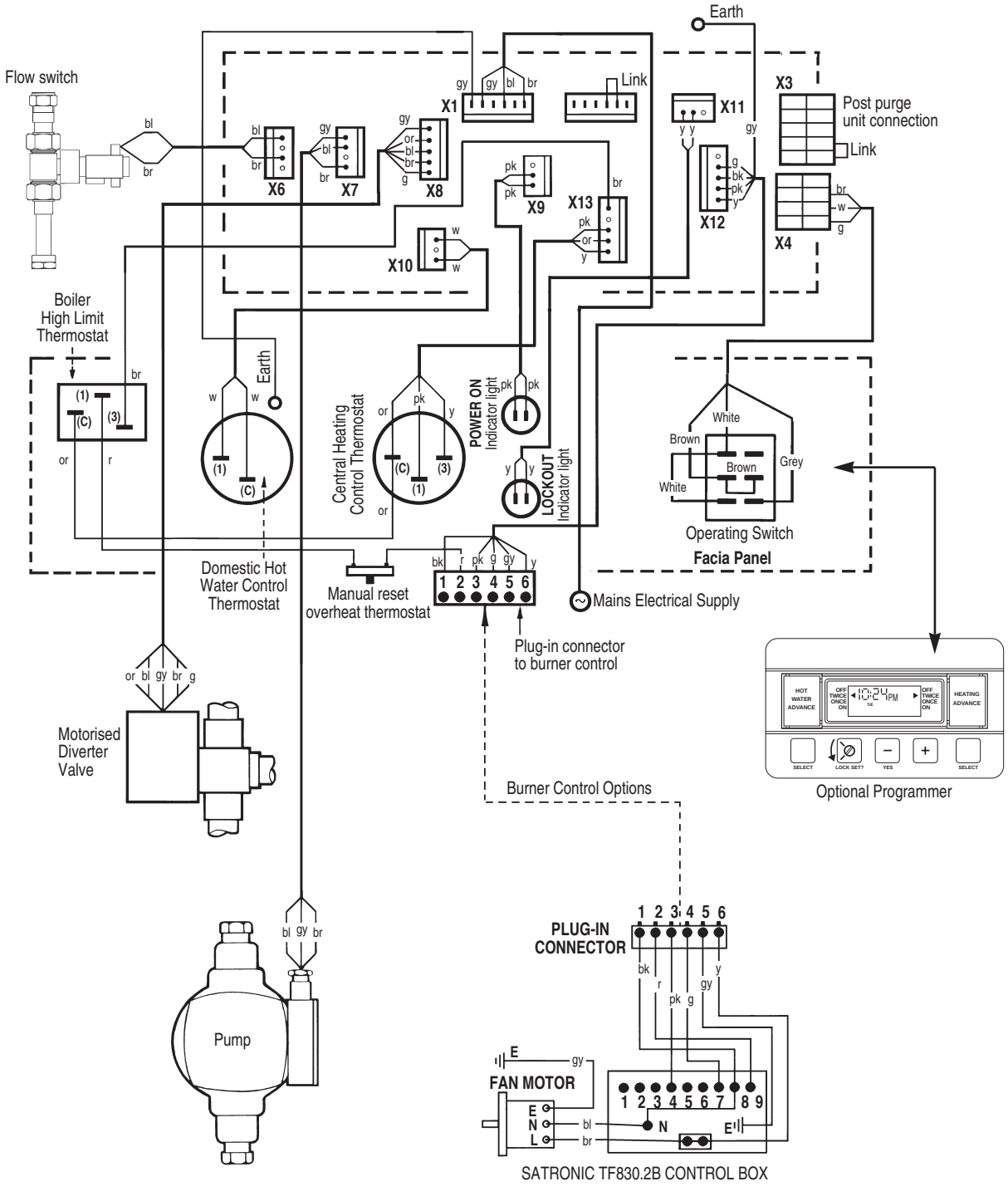
External Fuse 5A. Internal Fuse 3.15A (20 mm). Quick Blow.

LIVE-Brown, NEUTRAL-Blue, EARTH-Green/Yellow

Mains Cable: 0.75mm^2 (24 x 0.20mm) to BS6500 Table 16.

The method of connection to the appliance must allow complete isolation of the appliance, preferably via a double pole isolator with a contact separation of 3mm in all poles supplying the boiler and controls only.

Fig. 16. Wiring Diagram.



COLOUR CODE

br – brown bl – blue gy – green and yellow
r – red w – white y – yellow g – grey
bk – black or – orange pk – pink

Fig. 17. Schematic Electrical Diagram.

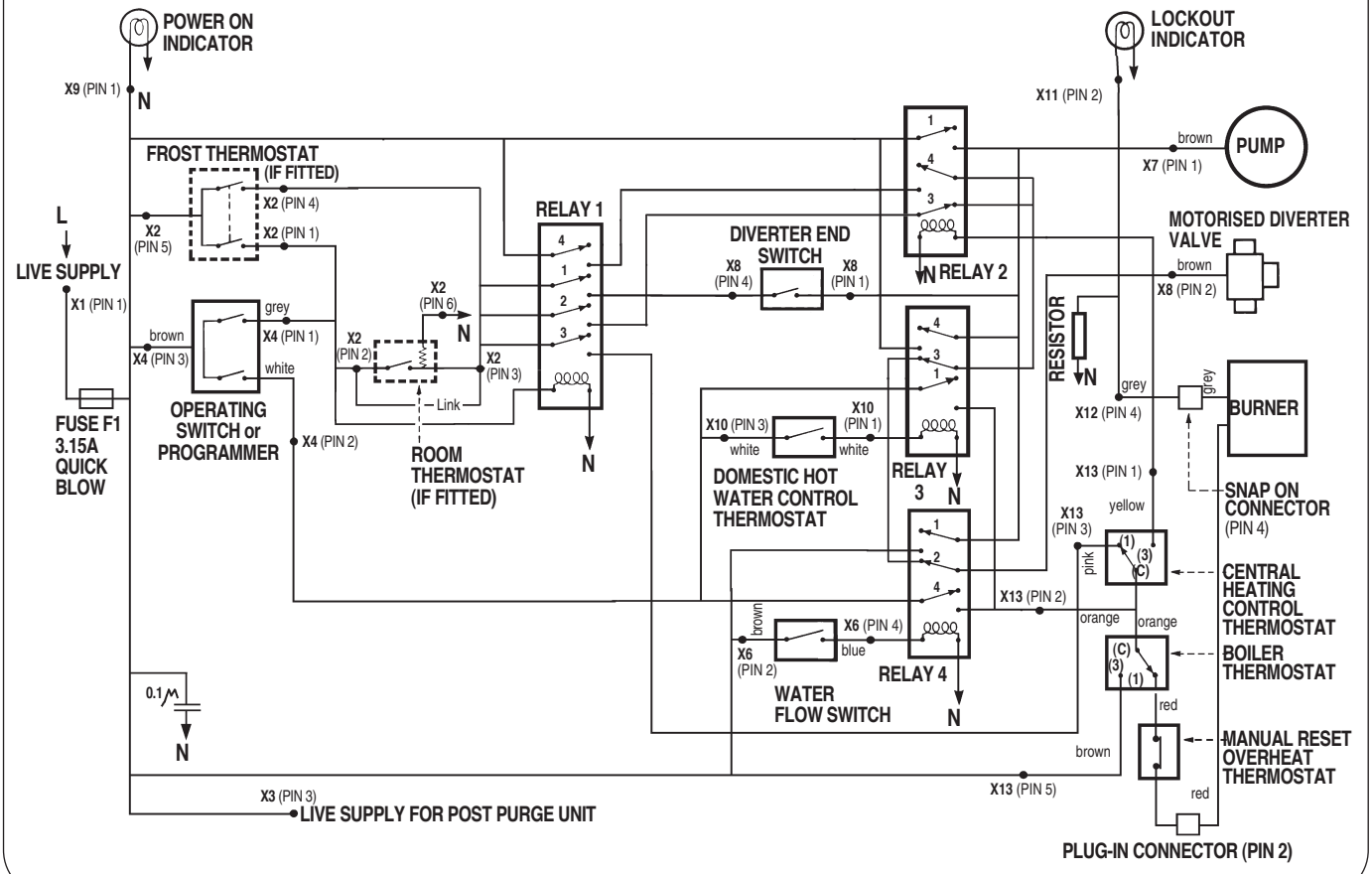


Fig. 18. Room and Frost Thermostat Connections

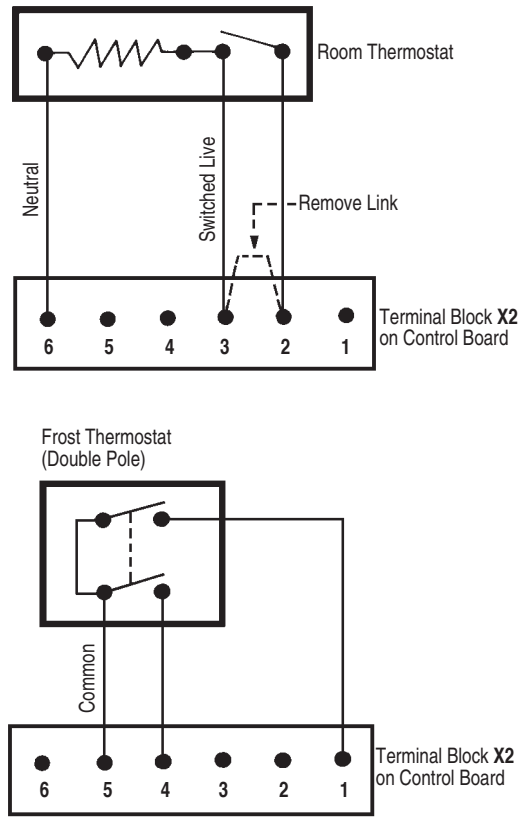


Fig. 19a. Facia Mounted Programmer Connections.

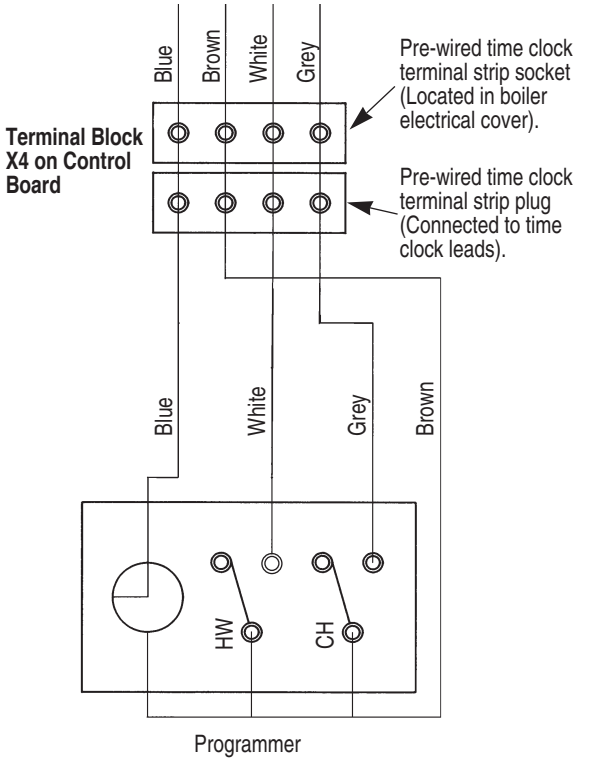
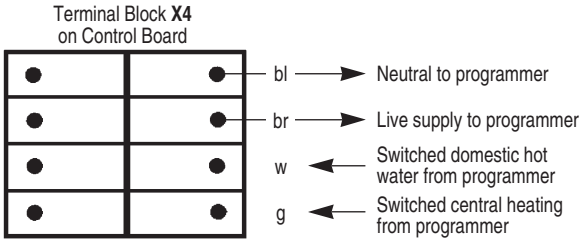


Fig. 19b. External Programmer Connections.



The mains supply cable should be connected into the mains connection points on the control board marked L (Live), N (Neutral) and E (Earth) on the control board and securely held in the cable clamp located on the base of the electrical box. To secure the cable, remove the clamp retaining screw and pull its inner body out to allow the cable to be fed through. With the cable in position refit the screw and fully tighten to grip the cable. Feed the cable between the side panel and the boiler insulation jacket and route to the connection point avoiding any hot surfaces.
The appliance must be earthed.

13.4 Facia Mounted Programmer
(See Fig. 19a)
A plug in, colour co-ordinated, 2 channel electronic programmer is available from Worcester Heat Systems. The programmer will give fully independent central heating (CH) and hot water (HW) programmes when the switch on the rear of the unit is set to P. Full instructions covering installation and operation of the programmer are included with the kit.

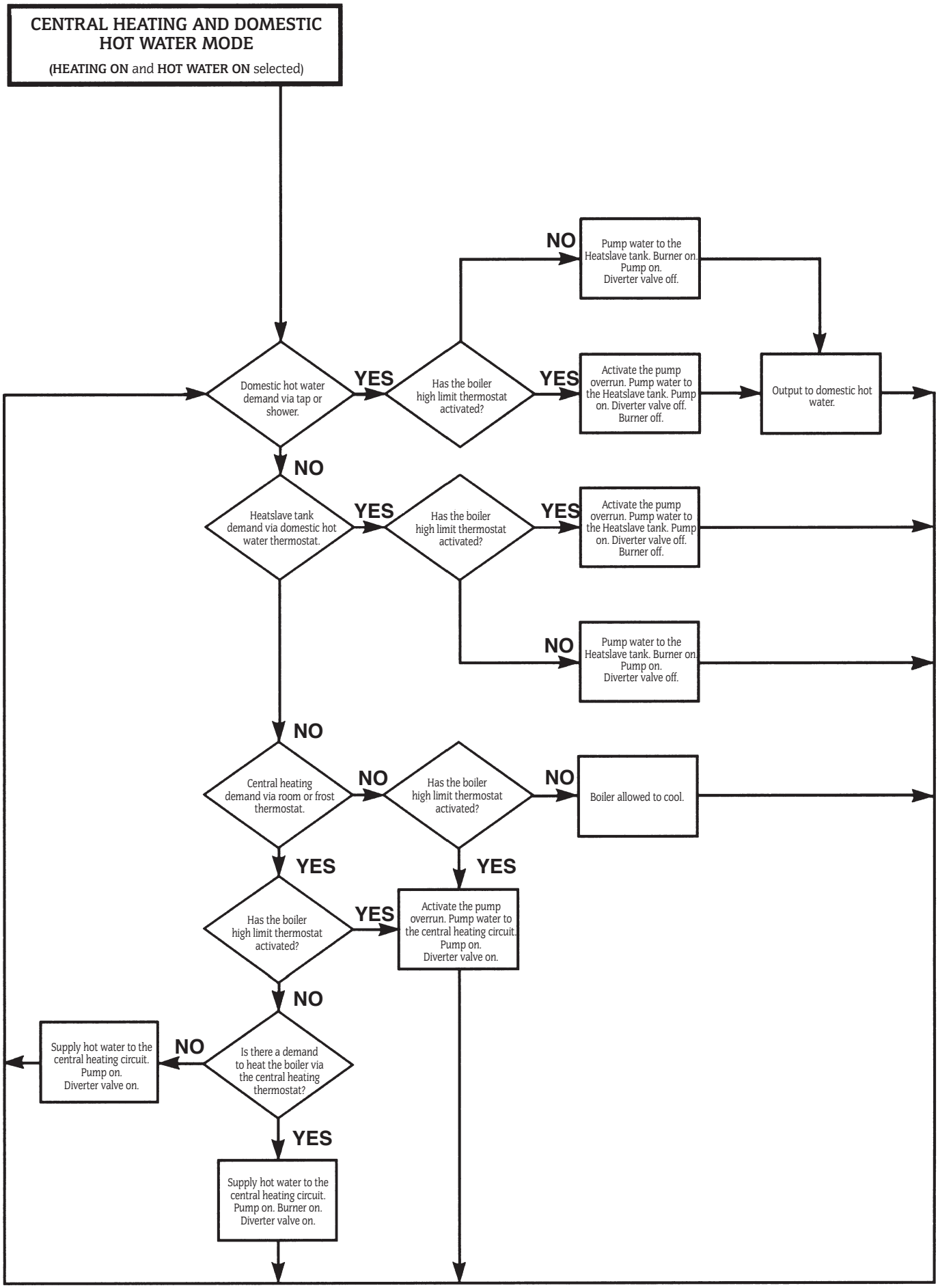
13.5 External Programmer
(See Fig. 19b)
A programmer offering time controlled central heating and domestic hot water or one which provides controlled central heating and switched domestic hot water is acceptable.

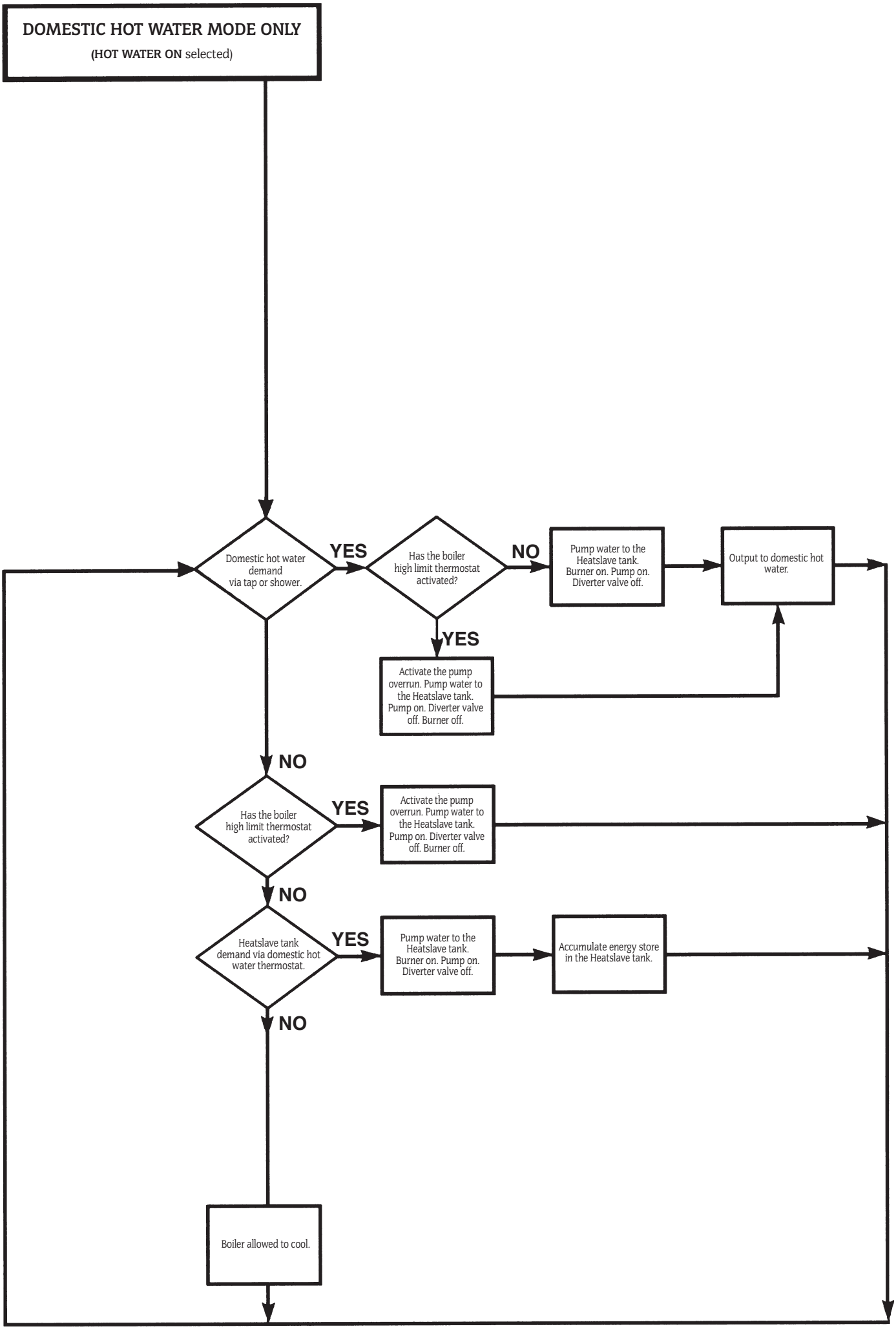
Fitting an external programmer:
Check that the electrical supply has been turned off and remove the facia panel as described in Section 19.2 (15).
The external programmer must take its power supply from the appliance. See Fig 19b. The leads must be insulated as they operate at mains voltage.
Pass the leads through the hole provided in the control box back panel and connect them to terminal block **X4** to which the leads from the facia mounted switch are currently still connected. See Fig. 19b.
Disconnect the grey lead from the terminal block and connect, in its place, the central heating control lead from the programmer.
Disconnect the white lead from the terminal block and connect, in its place, the domestic hot water control lead from the programmer.
Disconnect the brown lead from the terminal block and connect, in its place, a brown lead (live supply) to the programmer.
The remaining connection in the block is the neutral connection for the programmer.
Where an earth point is provided on the programmer then this should be wired to the appliance control box earth point on the **X1** terminal block.
Although inoperative, the facia mounted switch should be left in place. Remove the spade connectors from the user operating switch and discard the wires removed.
Refit the facia and set the programmer.
Check the operation of the appliance in response to the switching of the programmer.

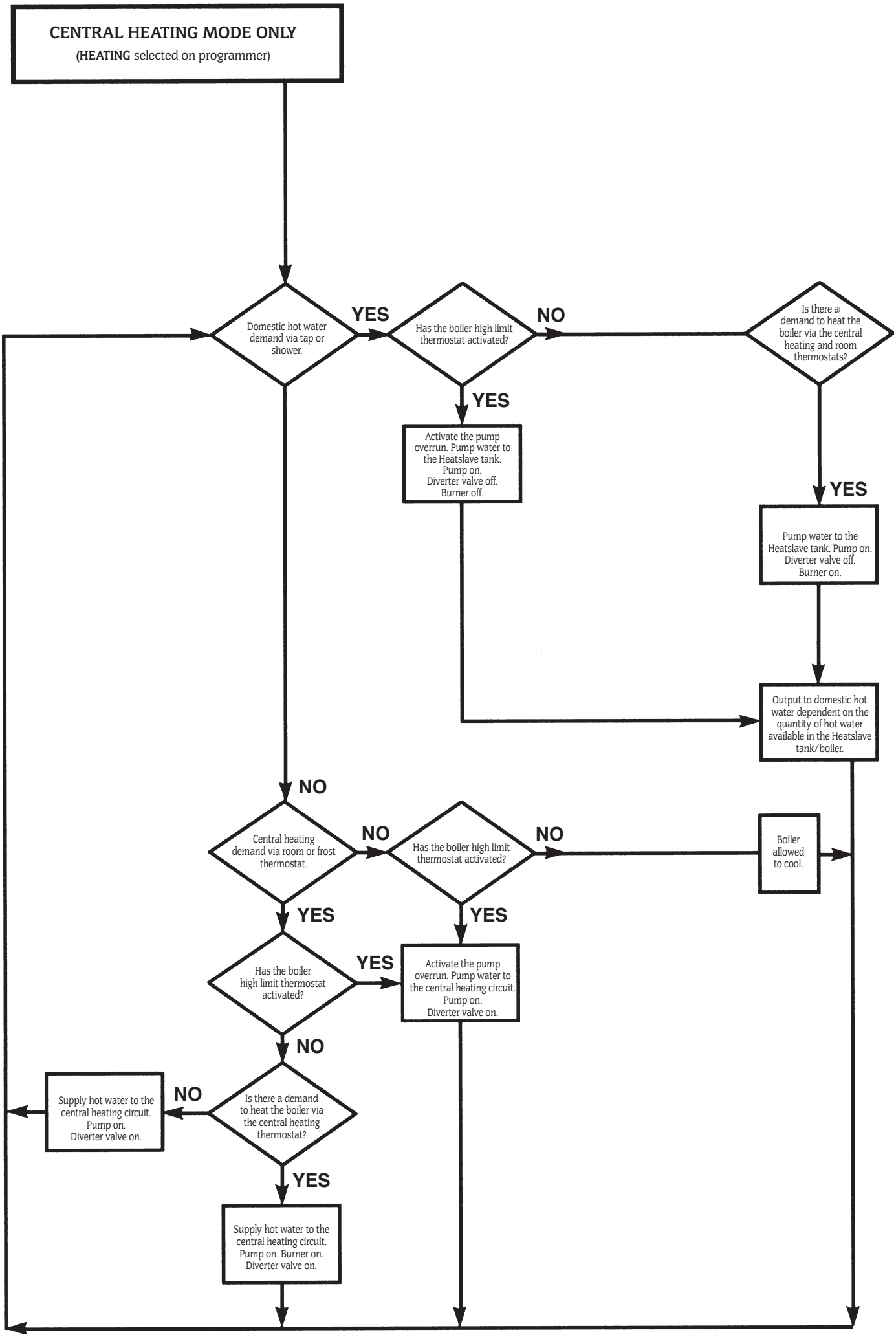
13.6 External Thermostats
If a room and/or frost thermostat is to be fitted, refer to Fig 18. The thermostats must be suitable for use on mains voltage.
An optional earth point is provided on the **X1** terminal block if required.

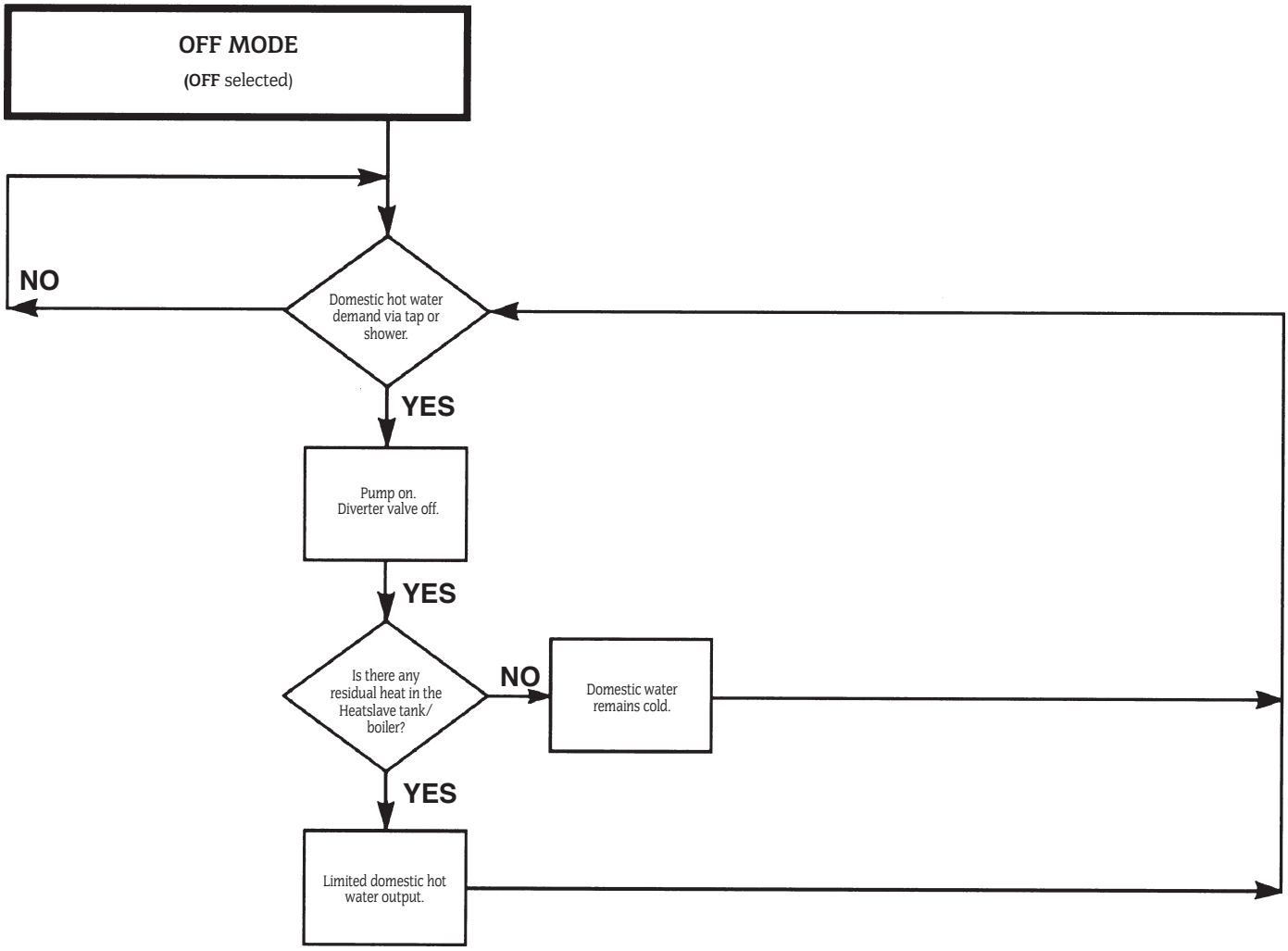
13.7 Safety Check
In the event of an electrical fault after the installation of the appliance, the electrical system shall be checked for short circuits, fuse failure or incorrect polarity of connections.

14. Functional Flow Chart


CENTRAL HEATING AND DOMESTIC HOT WATER MODE
(HEATING ON and HOT WATER ON selected)
Domestic hot water demand via tap or shower.
YES
Has the boiler high limit thermostat activated?
YES
Activate the pump overrun. Pump water to the Heatslave tank. Pump on. Diverter valve off. Burner off.
Output to domestic hot water.
NO
Pump water to the Heatslave tank. Burner on. Pump on. Diverter valve off.
NO
Heatslave tank demand via domestic hot water thermostat.
YES
Has the boiler high limit thermostat activated?
YES
Activate the pump overrun. Pump water to the Heatslave tank. Pump on. Diverter valve off. Burner off.
NO
Pump water to the Heatslave tank. Burner on. Pump on. Diverter valve off.
NO
Central heating demand via room or frost thermostat.
NO
Has the boiler high limit thermostat activated?
NO
Boiler allowed to cool.
YES
YES
Has the boiler high limit thermostat activated?
YES
Activate the pump overrun. Pump water to the central heating circuit. Pump on. Diverter valve on.
NO
Is there a demand to heat the boiler via the central heating thermostat?
NO
Supply hot water to the central heating circuit. Pump on. Diverter valve on.
YES
Supply hot water to the central heating circuit. Pump on. Burner on. Diverter valve on.


DOMESTIC HOT WATER MODE ONLY
(HOT WATER ON selected)
Domestic hot water demand via tap or shower.
YES
Has the boiler high limit thermostat activated?
NO
Pump water to the Heatslave tank. Burner on. Pump on. Diverter valve off.
Output to domestic hot water.
YES
Activate the pump overrun. Pump water to the Heatslave tank. Pump on. Diverter valve off. Burner off.
NO
Has the boiler high limit thermostat activated?
YES
Activate the pump overrun. Pump water to the Heatslave tank. Pump on. Diverter valve off. Burner off.
NO
Heatslave tank demand via domestic hot water thermostat.
YES
Pump water to the Heatslave tank. Burner on. Pump on. Diverter valve off.
Accumulate energy store in the Heatslave tank.
NO
Boiler allowed to cool.


CENTRAL HEATING MODE ONLY
(HEATING selected on programmer)
Domestic hot water demand via tap or shower.
YES
Has the boiler high limit thermostat activated?
NO
Is there a demand to heat the boiler via the central heating and room thermostats?
YES
Activate the pump overrun. Pump water to the Heatslave tank. Pump on. Diverter valve off. Burner off.
YES
Pump water to the Heatslave tank. Pump on. Diverter valve off. Burner on.
Output to domestic hot water dependent on the quantity of hot water available in the Heatslave tank/boiler.
NO
Central heating demand via room or frost thermostat.
NO
Has the boiler high limit thermostat activated?
NO
Boiler allowed to cool.
YES
YES
Has the boiler high limit thermostat activated?
YES
Activate the pump overrun. Pump water to the central heating circuit. Pump on. Diverter valve on.
NO
Is there a demand to heat the boiler via the central heating thermostat?
NO
Supply hot water to the central heating circuit. Pump on. Diverter valve on.
YES
Supply hot water to the central heating circuit. Pump on. Burner on. Diverter valve on.



15. Installation

15.1 After unpacking the appliance it is recommended that all cabinet panels are removed, as described in Section 5, and stored in a safe place to avoid damage during installation and allow easy inspection for leaks after the system has been filled.

15.2 Remove the burner as described below and store in a safe place until the appliance is ready for commissioning.

(a) Conventional Flue Appliance (CF/LLD).

1. Remove the electrical lead plug by depressing the two locking ears and pulling the plug downwards.

2. Remove the burner from the boiler by slackening the two M6 retaining screws located in the burner housing ring and pulling the burner clear. This will require the use of a 5mm allen key.

(b) Room Sealed Balance Flue Appliance (RS).

1. Remove the burner box cover by pulling forwards to release the ball studs. This will be found easier by pulling on the one side of the handle first to release two of the ball studs and then repeating on the other side. Take care not to pivot the remaining two ball studs too far around as this will cause damage to the spring clips.

2. Remove the electrical lead plug by depressing the two locking ears and pulling the plug downwards.

3. Push the electrical lead grommet back through the burner surround box and feed the lead through the hole.

4. Remove the burner from the boiler by slackening the two M6 retaining screws located in the burner housing ring and pulling the burner clear. This will require the use of a 5mm allen key.

15.3 Flue System Installation

Install the appliance flue system as described in Section 7.

15.4 Heating System Installation.

1. Plumb the boiler into the central heating system.

2. Check that all unused sockets have been plugged.

3. The following procedure should be used when filling the system:

Set the diverter valve to the mid position by moving the manual lever to the left hand side and locking in position. Open all radiators and lockshield valves and remove and discard the automatic air vent cap on the Heatslave tank .

Fill the system and check that air is being discharged from the automatic air vent.

Vent each radiator in turn to remove the air from the system. Bleed any air from the appliance pipework using the manual air vents provided.

When the system has been completely vented, turn the Domestic Hot Water Control Thermostat fully anti-clockwise and set the user operating switch to heating and hot water on. The pump will now operate and any remaining air can be purged from the system using the appropriate bleed points.

Return the diverter valve lever to the normal right hand side position.

4. Check the boiler and all pipework connections for leaks.

15.5 Domestic Water Installation

1. Connect the incoming domestic water supply to the 15 mm compression isolating valve.

2. Connect the main domestic hot water supply pipe to the hot water outlet via a 22mm pipe, to ensure minimum pressure drop in the circuit.

3. Ensure that no air traps are formed in the pipe-work as this will cause the flow switch to bounce when a hot or cold tap is turned off rapidly.

4. See section 12 for further details.

15.6 Oil supply installation.

(See Fig. 10 to 12).

NOTE: Never route the oil supply pipe/hose directly below the combustion chamber base.

(a) Double pipe system oil return pipe.

When fitting an RS balanced flue appliance follow 1 to 11. When fitting a CF/LLD appliance follow step 1 and fit a bulkhead fitting to the bracket for the return pipe and continue from step 10.

1. Remove the isolating valve bulkhead fitting by unscrewing the locknut on the underside.

2. Remove the blind grommet from the fixed burner surround box and discard.

3. Replace the blind grommet with the open grommet supplied in the plastic bag.

4. Slacken the pipe retaining clip screw located directly below the grommet hole. When using 12mm copper pipe replace the clip with the larger one supplied.

5. Bend a piece of 10mm or 12mm copper tube (as selected) to the correct profile to allow the pipe to be fed down the side of the appliance. Make a slight chamfer on the end of the pipe to be fed through the grommet to facilitate easy insertion.

6. Lubricate the grommet hole with vaseline (or butter etc.) and slide the pipe through the hole, supporting the grommet on its underside to prevent it dislodging.

7. Feed the pipe through the retaining clip, allowing approximately 80mm of pipe to project beyond the clip, and tighten the retaining screw. Take care not to overtighten the screw!

8. Hold the pipe at the retaining clip and gently pull the pipe forward sufficiently to allow a compression to ¼ inch BSP female fitting to be fitted for connection to the oil return flexible hose.

9. Connect the fitting to the pipe and fit a ¼ inch BSP taper thread flexible hose, ensuring a good seal using PTFE tape or suitable oil sealing compound. The flexible hose should have a ¼ inch BSP rotating union taper fitting at the other end with a 90 degree bend and ¼ inch BSP nipple for connection to the oil pump.

10. Replace the isolating valve bulkhead fitting.

11. Fit the oil supply pipe as described in the following section.

(b) Single pipe system oil supply pipe.

1. Bend a piece of 10mm or 12mm copper tube (as selected) to the correct profile to allow the pipe to be fed down the side of the appliance. The pipe may be routed either along the right or left hand side of the boiler as required. When using 12mm pipe fit a 12mm to 10mm compression coupling and connect to the valve with a short piece of 10mm pipe, otherwise connect directly to the valve.

NOTE: Never use soldered joints on the oil supply pipes as this could cause a hazard in the case of a fire.

2. Route the pipe back to the oil supply tank ensuring that it is hard against the boiler, to allow installation of the side panel.

3. With the isolating valve in the correct orientation tighten the back-nut.

4. Turn the isolating cock fully clockwise to close the valve.

5. Open the main oil supply valve at the tank and check for any leaks.

6. Place a suitable container below the bulkhead fitting and open the valve.

7. Draw off at least 2.5 litres of oil until a steady flow of clear uncontaminated oil can be seen and turn off the isolating valve.

NOTE: This method may not be possible on some installations where a sub-gravity system used. Where the problem arises bleed the system using the oil pump as described in Section 16 and remove and clean the oil pump filter to remove any debris collected as result of installation.

15.7 Replace the electrical control panel and side panels in reverse order to the removal procedure of Section 5 and connect the electrical supply as described in Section 13.

16. Commissioning the Appliance

Ensure that no foreign matter is left in the system as this could cause damage to the appliance.

Check that the electrical supply to the appliance is switched off.

16.1 Domestic Hot Water System

Check that the mains water supply has been fully flushed out at installation.

16.2 When commissioning the appliance after initial installation follow the procedure from 16.3, otherwise remove the burner first as described in Section 18.3.

16.3 Appliance and System Preparation

1. After initial installation and checking for leaks, as previously described, drain down the system sufficiently to add a flushing agent. Flush the system in accordance with BS 7593:1992.

2. Fill the system using one of the methods described in Section 10, adding a suitable corrosion inhibitor in accordance with BS7593:1992.

3. Check that the pressure relief valve operates by turning the knob anti-clockwise until water is expelled from the discharge pipe.

4. Set the Expansion Vessel Pressure

The charge pressure of the expansion vessel as despatched is 0.5 bar, which is equivalent to a static head of 5 metres (16.7 ft.). The charge pressure must not be less than the static head at the point of connection. See Figs 13 and 14. A Schraider type tyre valve is fitted to the expansion vessel to allow the charge pressure to be increased if necessary.

5. Set the System Pressure

Fill the system until the pressure gauge shows 1.5 bar (21.5 lb./in^2) and check for water soundness. Release water from the system, using the pressure relief valve knob, until the System Design Pressure is obtained, up to a maximum of 1.5 bar.

System Design Pressure in bar = Static Head of the System in bar + 0.3.

NOTE: 1 bar is equivalent to 10.2 metres (33.5 ft) of water. Set the movable pointer giving a permanent record of the set system pressure.

If the pressure indicated on the pressure gauge is greater than 2.5 bar when operating at the maximum central heating temperature, an extra expansion vessel must be fitted to the system as close as possible to the appliance central heating return connection. Refer to Section 10 for further information on system capacities.

Any extra vessel fitted must be pressurised to the same figure as the integral vessel. If the expansion vessel fails then the specified replacement must be fitted.

16.4 Check the Burner

1. Check that the nozzle and electrode settings are correct for the relevant burner. See Figs 21 and 22.

2. Check that the nozzle lies central with the combustion head hole.

3. Check for any visible defects.

16.5 Replace the burner.

1. Connect the flexible oil supply hose to the isolating valve bulkhead fitting and tighten sufficiently to form a good seal. Where a double pipe system is being used fit the bypass plug, as described in Fig. 10 and connect the oil return pipe fitting.

2. With the sponge O-ring gasket around the burner blast tube insert the burner into the housing tube. Push the burner firmly forward to compress the gasket and tighten the two locking screws with a 5mm allen key.

NOTE: It is important that a good seal is made between the burner and the boiler to prevent re-circulation of the flue gases from the combustion chamber to the burner inlet, or the room in the case of a CF/LLD appliance.

3. On the RS balanced flue model, feed the electrical lead back through the hole in the burner surround housing and fit the grommet into the hole ensuring a seal is made.

4. Re-connect the electrical lead plug into the control box.

16.6 Check the installation.
1. Check that the appliance is correctly wired as described in Section 13.
2. Check that all baffles are correctly located and the heatshield (20/25 model only) is correctly mounted as shown in Fig 23.
3. Check that the baffle retainer is correctly mounted (20/25 model only) as shown in Fig 23.
4. Check that the four thermostat phials are correctly located in the thermostat pockets positioned in the top front of the boiler and in the Heatslave tank.
5. Check that all of the air-ways to the burner are clear of any obstruction.
16.7 Fit a pressure gauge and manifold to the burner pump at the point indicated in Fig 10, or the pressure gauge port shown in Fig 22 on the 20/25.
16.8 Turn on the electricity to the appliance.
16.9 Bleed the burner (single pipe system only).
Release the fuel bleed port on the manifold and place a suitable receptacle beneath. Turn on the Central Heating Control Thermostat. Set the operating switch (or programmer) to **heating and hot water** and allow the burner to run through to Lockout. Wait two minutes and reset the burner control box. Repeat the procedure at least three times or until a steady stream of oil, without air, is exhausted from the bleed port. Re-lock the bleed port.
16.10 Adjust the air shutter and pump pressure to the settings recommended in the appropriate Table 2 to 5. After a pre-ignition period of approximately 15 seconds the burner should ignite. Flame sensing is carried out by means of a photocell mounted in the burner body. Should the boiler fail to establish a normal firing pattern (or should flame failure occur during running) the absence of a flame is sensed and the control box is monitored to a safe lockout condition and the burner is shut down. The Lockout indicator light on the appliance facia panel will illuminate indicating that the burner has gone to lockout. In this instance wait two minutes, remove the appliance front cover and press the red lockout reset button mounted on the burner control box. Another start sequence is then initiated. Repeat the procedure until a flame is established.
NOTE: Persistent Lockout when running indicates a fault and a Service Engineer should be consulted.
16.11 Run the boiler for approximately three minutes and then switch off checking that there is no after-spurting from the nozzle. This can be detected by oil saturation on the blast tube. If after-spurting occurs, remove the burner from the boiler, unscrew the nozzle and while holding the burner in a vertical position, fill the nozzle holder with oil. Refit the burner and continue to run the boiler for three minute periods until after-spurting stops.
NOTE: In order that after spurting is reduced to a minimum during the commissioning period it is recommended that a pressure gauge only is fitted on the external pressure gauge port on the Electro Oil B11 (see Fig. 22). Use of a "T" piece pressure gauge manifold will increase the oil line volume and hence increase the degree of after-spurting.
16.12. Run the boiler for a further 15 minute period and then finally fine tune the air shutter setting to give the CO_2 levels specified in the appropriate Table 2 to 5 less 0.5% CO_2. During this period some smoke will be emitted due to the burning of organic binder in the base insulation board. Smoke readings will therefore be inaccurate at this point.
NOTE: A flue gas sampling point is located on the boiler top plate.
16.13. Check that the smoke reading is in the range 0-1. If this cannot be achieved check that the burner head is set correctly and the nozzle is in good condition.
16.14. Check that the flue gas temperature does not exceed the values specified in Tables 2 to 5. If the flue gas temperature is too high, check that the baffles are correctly located. If the baffles are correctly located then reduce the pump pressure since nozzle variations of up to + or-15% may occur.
16.15 Turn off the electrical supply to the appliance and isolate the oil supply to the burner. Remove the oil pressure gauge and manifold and re-fit the blanking plug. Check the oil system for any signs of leakage.
16.16 On the RS balanced flue model re-fit the burner box cover by lining up the four ball studs, and the polarising pin in the top flange of the box, and firmly pushing forward. Check that the cover is properly seated by pressing forwards on the front top and then bottom face of the box to ensure a room seal is achieved.
On the CF/LLD model fit the cabinet front panel.
16.17 Allow the burner to run for a further five minutes and then recheck the CO_2 level and adjust the air setting if required. With the burner cover/panel fitted as 16.16, repeat the previous test procedure and check that the smoke is in the range 0-1. Repeat the fine tuning procedure if found necessary.
16.18 Re-fit the blanking plug in the flue sampling hole.
16.19 Refit the cabinet top and front panels in reverse order to that described in Section 5.
16.20 Operation
Turn on the electricity supply to the appliance
Domestic Hot Water Mode
Set the operating switch (or programmer) to off and fully open a hot tap.
The pump should operate to allow primary water to flow to the Heatslave tank. The burner should not operate.
Close the hot tap and set the Domestic Hot Water Control Thermostat to maximum and the operating switch (or programmer) to hot water on. The burner and pump should now operate to allow primary water to flow to the Heatslave tank.
Set the Domestic Hot Water Control Thermostat to the minimum setting and wait for the burner and pump to switch off. The Heatslave tank will now be charged to its minimum energy level and is available for domestic hot water usage.
Fully open a hot water tap. The burner and pump should now operate and hot water should be available at the hot tap.
With a suitable measuring container, check the water flow rate. The 12/14 and 15/19 appliances should give a maximum flow rate of 15 litres/min (± 15%) (3.3 gallons/min)
The 20/25 appliance has no flow restrictor and the maximum flow rate is dependent on the cold inlet supply pressure. This can be manually adjusted at the mains cold water inlet isolating valve. The maximum recommended flow rate for this model is 17 litres/min (3.7 gallons/min)
Fully close the tap and check that the burner and pump switch off.
NOTE: The burner fan will operate for a further period of 50 seconds when a low level discharge post purge unit is fitted. The pump may also remain on for a short period if the boiler high limit thermostat has tripped out and activated the pump overrun.
Central Heating Mode
Check that all of the radiator valves are open and set the room thermostat to maximum. Set the Central Heating Control Thermostat to maximum and turn the Domestic Hot Water Control Thermostat fully anti-clockwise.
Set the operating switch (or programmer) to heating on and hot water on. The burner should ignite, the pump should operate and the diverter valve should open to allow primary water to flow to the central heating circuit.
Check the system to ensure all of the radiators are heating up evenly. Balance the system so that the required temperature difference across the heating flow and return pipes is obtained relevant to the heating load.
Set the Central Heating Control Thermostat (or room thermostat fitted) to minimum and check that the burner, pump and diverter valve switch off.
Domestic Hot Water and Central Heating Mode
Set the Central Heating Control Thermostat to maximum and turn the Domestic Hot Water Control Thermostat fully anti-clockwise. Set the operating switch (or programmer) to heating on and hot water on. Set the room thermostat to maximum. The burner, pump and diverter valve should all operate allowing water to be pumped to the central heating circuit.
Set the Domestic Hot Water Control Thermostat to maximum. The diverter valve should close and divert the flow to the the Heatslave tank.

16.20 Completion of Commissioning

If the appliance is being passed over to the user immediately, refer to Section 17 and set the controls to the users requirements.

If the appliance is to be left inoperative, set the operating switch (or programmer) to OFF.

Turn off the oil supply at the isolating valve and switch off the electricity supply.

If there is any possibility of the appliance and system being left inoperative during frost conditions then drain the appliance and system.

17. Users Instructions

17.1 Hand the Users Instructions to the user or purchaser for retention; instruct them in the efficient and safe operation of the appliance and the heating/hot water system.

17.2 Advise the user or purchaser of the precautions necessary to prevent damage to the system and to the heating/hot water system remaining inoperative during frost conditions.

17.3 Finally, advise the user that for continued efficient and safe operation of the appliance, it is important that adequate servicing is carried out by a qualified engineer at least once a year.

17.4 Worcester Heat Systems Limited will be pleased to discuss and offer a comprehensive maintenance contract.

Set the system controls to the users requirements.

18. Routine Cleaning and Inspection

18.1 Routine Servicing

To ensure efficient trouble free operation, the following should be carried out at least once a year for appliances using 28 second kerosene and twice a year for appliances using 35 second gas oil.

IMPORTANT: Disconnect the electrical supply at the mains before commencing any servicing. Turn off the oil supply at the service cock.

1. Carry out a pre-service check and note any operational faults.

2. Check and clean the burner.

3. On the CF model check and clean the air intake grille located in the boiler room.

4. On the RS balanced flue model check and clean the air intake ducts at the rear and underneath the boiler and the air intake grille at the end of the terminal.

5. Check and clean the baffle retainer (20/25 model only).

6. Check and clean the baffles.

7. Check and clean the heat exchanger surface

8. Check the heatshield (20/25 model only)

9. Check the combustion chamber insulation board.

10. Check that the flue system is unobstructed and clean as necessary.

11. If the appliance has been installed in a compartment, check that the ventilation areas are clear.

12. Clean all oil filters.

Some of the servicing points are covered more fully in the instructions following:

18.2 Pre-Service Check

1. Remove the cabinet front and top panels as described in Section 5.

2. On the RS balanced flue model remove the burner box cover as described in Section 5.5.

3. Operate the appliance and system. Note any faults which may need to be corrected during the service.

18.3 Clean the Burner

1. Remove the burner.

(a) Isolate the electrical supply to the appliance

(b) Isolate the oil supply at both the oil tank and the isolating valve situated above the burner. (see Fig. 3 and 4).

(c) On the RS balanced flue model remove the burner box cover by pulling forwards to release the ball studs. This will be found easier by pulling on one side of the handle first to release two of the ball studs and then repeating on the other side. Take care not to pivot the remaining two ball studs too far around as this will cause damage to the spring clips.

(d) Disconnect the electrical lead from the control box by depressing the two locking ears on the plug and pulling downwards.

(e) On the RS balanced flue model feed the electrical lead back through the grommet seal to give sufficient play to allow withdrawal and inspection of the burner.

(f) Slacken the two M6 burner locking screws and remove the burner.

4. Clean the fan impeller using the following procedure:

Electro Oil Inter B9 Burner

(a) Remove the two screws holding the combustion head in position and withdraw the combustion head and air guide collar (where fitted).

(b) Remove the three remaining screws holding the front cover plate in position and withdraw the cover to expose the fan impeller.

(c) Clean both sides of the fan impeller and remove any debris from the burner housing.

(d) Check that the impeller rotates freely.

(e) Clean the air inlet passage and check that the adjustment mechanism, operates freely.

(f) Reassemble the components.

Electro Oil Inter B11 Burner

(a) Remove the acoustic fan inlet cover.

(b) Remove the five screws holding the fan cowl in position and remove the cowl noting how the fan control flap is positioned.

(c) Check that the air control flap pivots freely and ensure that the air path to the burner head is clear.

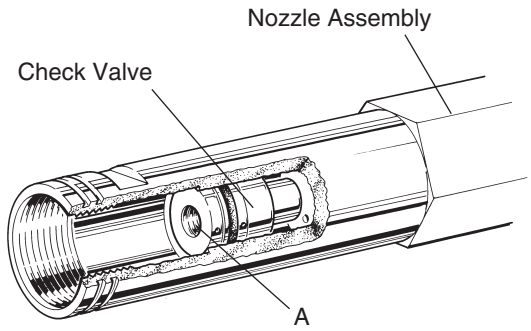
(d) Clean both sides of the fan impeller and remove any debris from the burner housing.

(e) Check that the impeller rotates freely.

(f) Reassemble the components.

3. Remove the combustion head and thoroughly clean any deposits.

Fig. 20. Mechanical Shut-off Valve



4. Inspection of Mechanical Shut-off Valve.

(a) Remove the nozzle

(b) Fasten an M5 screw, with a minimum length of 30mm, into the threaded hole (A) and pull the screw to withdraw the check valve.

(c) Check that the nozzle holder is clear of any debris and clean if necessary.

(d) Check that the three holes in the check valve are clear of any debris. Discard the check valve if the holes cannot be cleared or if the unit is defective and replace with a new one.

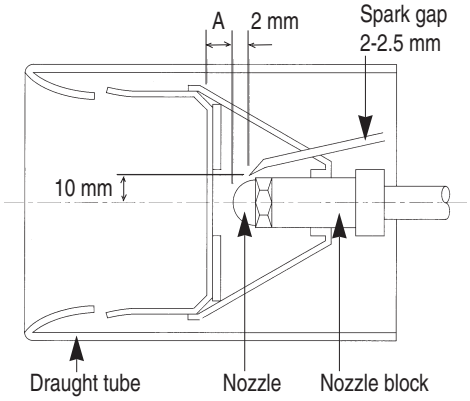
(e) Replace in the reverse order.

5. It is strongly recommended that the oil atomising nozzle is replaced at each service. If this is not possible then remove and clean the integral filter. Under no circumstances should the nozzle be stripped into its component parts and never attempt to clean the nozzle tip.

6. Check the electrodes and reset if necessary as shown in Figs. 21 and 22.

Fig. 21. Electro Oil Inter B9 Burner. (12/14 and 15/19 models).

Combustion Head



Output	Head Type	Dimension A
12	PL 6/7/21.5/10	3 mm
14	PL 6/7/21.5/10	5 mm
15	PL 6/7/21.5/10	3 mm
17	PL 6/7/21.5/10	5 mm
19	PL 6/7/21.5/10	5 mm

To adjust the nozzle position, undo the locking screw located at the rear of the nozzle line and rotate the adjusting disc one turn anti-clockwise to move forward by 1 mm.

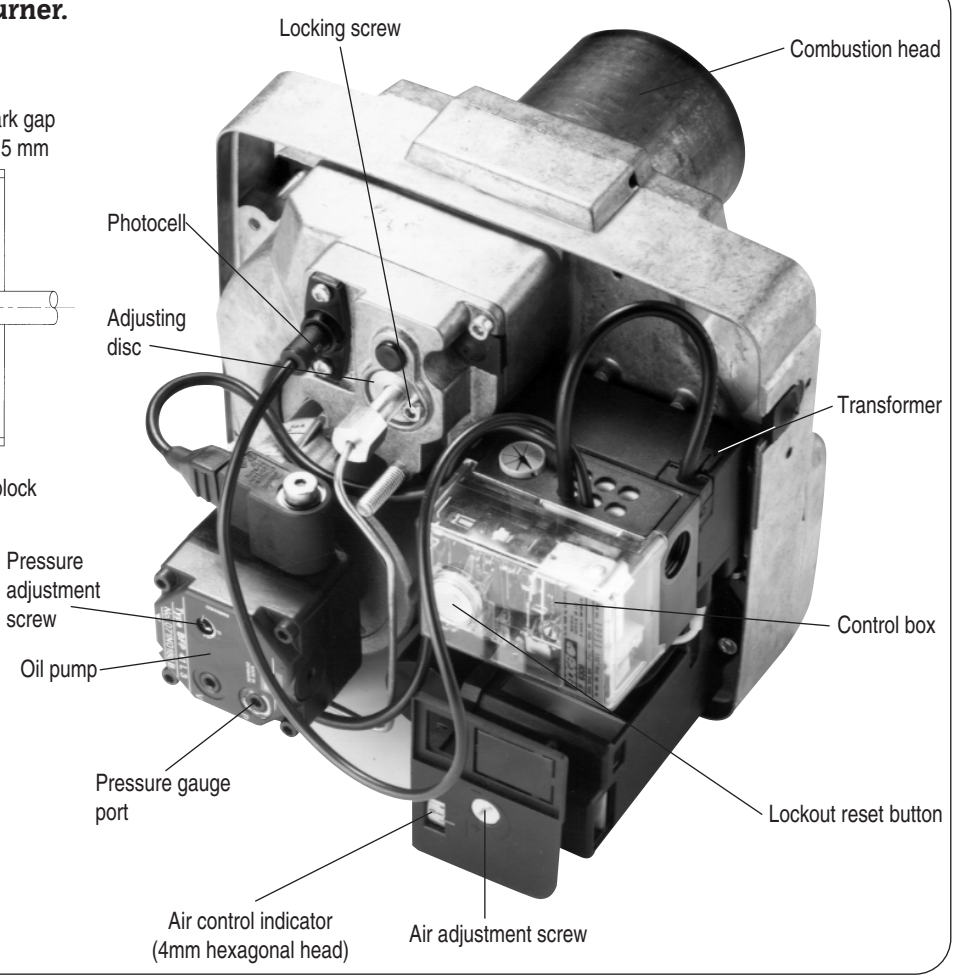
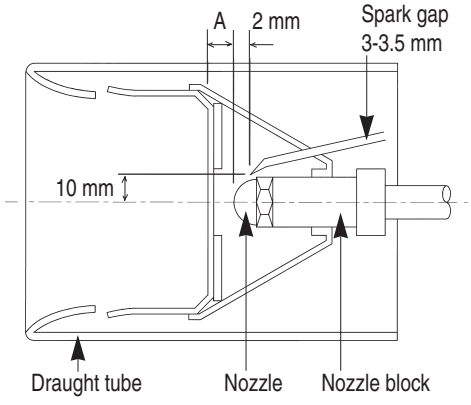
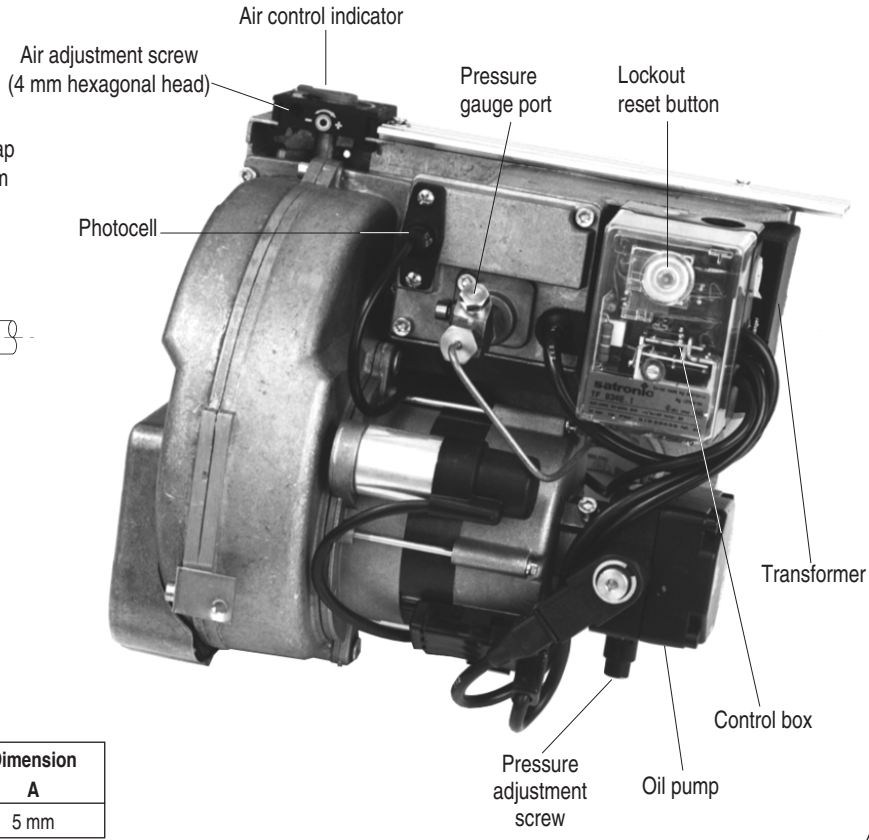


Fig. 22. Electro Oil Inter B11 Burner. (20/25 model).

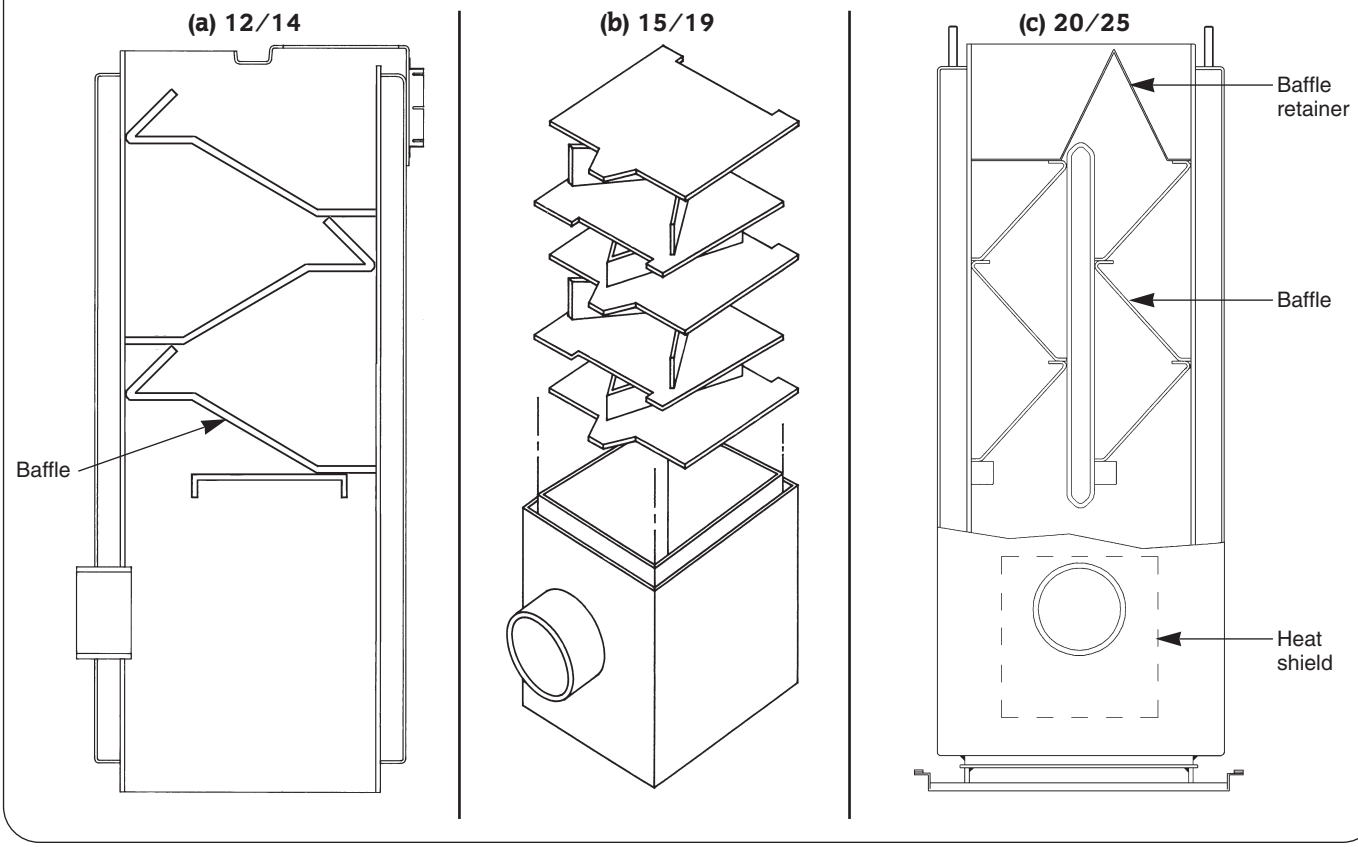
Combustion Head





Output kW	Combustion Head	Dimension A
20/25	PL 10/4/24/10 x 78 mm	5 mm

Fig. 23. Location of Boiler Flueway Baffles.



7. Replace the combustion head. Check that the nozzle lies central to the combustion head and the head settings are as shown in Figs. 21 and 22.

8. Withdraw the photocell from its housing and clean.

9. Remove and clean the oil pump internal filter using kerosene or white spirit. The internal filter is accessed by removing the oil pump cover on the Danfoss BFP 11 and Suntec AS47C and by unscrewing and withdrawing the cartridge on the Danfoss BFP 41 as indicated in Fig. 10.

9. It is recommended that the standard flexible oil line is replaced at each yearly service to prevent the possibility of a leak due to ageing.

10. Reassemble the burner components.

11. Check the sponge O-ring seal located around the combustion head and replace if necessary. It is imperative that this seal is in good condition since failure will cause flue gases to be re-circulated into the burner inlet or the room in the case of a CF/LLD appliance.

18.4 Remove the paper element from the external oil filter and replace it. If the filter contains a washable element, thoroughly clean in kerosene or white spirit and reassemble into the filter.

18.5 Clean the air ducts. (RS balanced flue model only).

1. Remove the rear duct top cover.

2. Shine a light down the rear duct and inspect both the rear and under duct for any sign of debris and clean where necessary using a flexible hose connected to a vacuum cleaner. A short length of garden hose would be suitable for this purpose.

3. Replace the rear duct top cover.

4. Check the oil bleed holes are clear. These are located in the base of the burner cover box and bottom front face of the burner housing.

18.6 Clean the Boiler

1. Remove the boiler top access door by releasing the two M10 nuts, check the fibreglass rope seal and replace if necessary.

2. Remove and check the baffle retainer where fitted (20/25 model only.See Fig.23c).

3. Remove the baffles, clean and check their condition. Replace any baffles considered to be badly corroded.

4. Thoroughly clean all of the heat exchanger surfaces using a stiff wire brush and vacuum clean all loose debris from the combustion chamber. Take care not to damage the base insulation!

5. Remove and check the heat shield (20/25 model only).(See Fig.23c).

6. Check the condition of the combustion chamber base insulation and replace if there is any sign of significant damage.

7. Check and clean the flue system if necessary.

8. Replace the items in reverse order noting the baffle positions shown in Fig.23.

18.7 Check that a fire valve is fitted to the incoming oil line with the body located outside the premises and the detection element located within the appliance case. A fire valve clip is provided for this purpose as shown in Figs 3&4. Test the operation of the fire valve to ensure that the mechanism operates and that the oil supply is completely isolated.

NOTE: The fire sensing element must be located on the top face of the burner surround box on RS balanced flue models, as shown in Fig.4, to allow quick detection of a dangerous situation.

18.8 Re-commission the Burner

1. Connect the flexible oil supply hose to the isolating valve bulkhead fitting and tighten sufficiently to form a good seal. Where a double pipe system is being used connect the oil return flexible hose to return pipe fitting.

2. With the sponge O-ring gasket around the burner blast tube insert the burner into the housing tube. Push the burner firmly forward to compress the gasket and tighten the two locking screws using a 5mm Allen key.

NOTE: It is important that a good seal is made between the burner and the boiler to prevent re-circulation of the flue gases from the combustion chamber to the burner inlet, or the room in the case of a CF/LLD appliance.

3. On the RS balanced flue model feed the electrical lead back through the hole in the burner surround housing and fit the grommet into the hole ensuring a seal is made.

4. Reconnect the electrical lead plug into the control box.

5. Turn on the oil supply at the service cock.

6. Recommission the burner as described in Section 16.

19. Replacement of Parts

WARNING

Switch off the electricity, oil and water supplies before replacing any components.

After the replacement of components, always check for soundness of connection of the above supplies where relevant and carry out functional checks as described in Section 16.

19.1 Component Access

To replace components it will be necessary to remove one or more sections of the cabinet as described in Section 5.

19.2 Component Replacement

1. Burner

For removal and servicing refer to Section 18.3.

2. Pump

Check that the electrical supply has been turned off.

Remove the appliance front panel and withdraw the burner to prevent water ingress.

Turn off the isolating valves mounted on the outlet of the pump and the boiler body, and drain the residual water via the drain plug below the pump inlet.

In most cases the pump may be replaced by simply removing and changing the motor/impeller assembly. This can be done by undoing the four screws holding the head to the body and pulling the head forwards. In cases where the pump body also needs replacing, undo the two union nuts and remove the pump from between the pipework. Note: A residue of water will remain in the pump.

Remove the pump electrical cover and disconnect the electrical leads taking note of the wire positions.

Replace the pump in reverse order

NOTE: The direction flow indicator on the pump should point upwards and the speed adjustment should be set to maximum (No: 3)

Open the valves and fill the system as described in Section 16.

3. Diverter Valve

Check that the electrical supply has been turned off.

Remove the appliance front, top panel and withdraw the burner to prevent water ingress.

Drain the boiler and Heatslave tank.

Turn off the isolating valve mounted on the boiler body, and drain the residual water via the drain plug below the pump inlet.

The diverter valve has a removable head to make replacement easier.

Remove the control box top cover.

Remove the diverter valve connector plug at **X8** on the control board.

Remove the diverter valve heyco bush from the control box and withdraw the electrical lead.

To gain access remove the electrical control box as described in Section 19.2 (11).

To replace the diverter valve head slacken the screw holding the diverter valve cover and remove.

Undo the two brass screws, remove the diverter valve head and fit a replacement in reverse order.

To replace the complete diverter valve undo the diverter valve compression fitting connected to the central heating flow pipe.

Undo the diverter valve compression fitting connected to the heatslave tank pipe and slacken the compression fitting on the heatslave tank.

Undo the diverter valve inlet compression fitting and slacken the pump inlet union.

Withdraw the diverter valve and fit replacement in reverse order.

NOTE: A residue of water will remain in the diverter valve.

Open the valves and fill the system as described in Section 16.

4. Heatslave Tank

Check that the electricity and mains water supplies have been turned off.

Remove the appliance front, top and left-hand side panel.

Withdraw the burner to prevent water ingress.

Drain the boiler and Heatslave tank.

Remove the electrical control box as described in Section 19.2 (11).

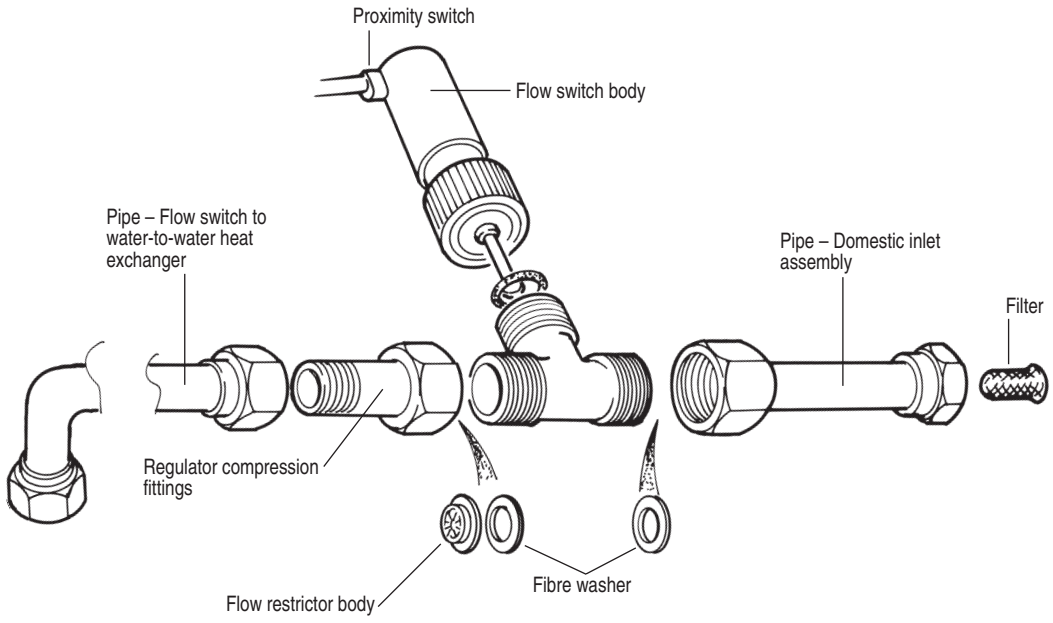
Remove the flow switch assembly and the domestic hot water heat exchanger as described in Sections 19.2 (8) and 19.2 (9)

Undo the compression fitting connecting the diverter valve to the Heatslave tank and remove the M6 nut and bolt holding the Heatslave tank onto the appliance base.

Remove the pressure relief valve as described in Section 19.2 (6).

Move the tank slightly to the left to dislodge the diverter valve

Fig. 24. Flow Switch Assembly.



fitting from the tank.
Raise the front end of the tank sufficiently to clear the base lip and withdraw the tank.
Remove the remaining components from the tank and refit to the replacement tank.
Fit a replacement tank in the reverse order.
Open all valves and fill the system as described in Section 16.

5. Expansion Vessel

Check that the electrical supply has been turned off.
Remove the appliance front panel and withdraw the burner to prevent water ingress.
Drain the boiler
Undo the nut connecting the vessel flexible pipe to the boiler.
Remove the vessel retaining bar by pulling upwards.
Withdraw the vessel and replace in the reverse order.
Open all valves and fill the system as described in Section 16.

6. Pressure Relief Valve

Check that the electrical supply has been turned off.
Remove the appliance front panel, top panel and withdraw the burner.
Drain the boiler.
Undo the compression fitting connecting the pipe to the relief valve.
Undo the union nut on the right hand side and withdraw the relief valve, taking care not to lose the fibre washer seal.
Fit a replacement valve in the reverse order.
Open all valves and fill the system as described in Section 16.

7. System Pressure Gauge

Check that the electrical supply has been turned off.
Remove the appliance front panel and withdraw the burner.
Drain the boiler.
Turn off the isolating valves mounted on the outlet of the pump and the boiler body, and drain the residual water via the drain plug below the pump inlet.
Unscrew the gauge from the pump inlet manifold.
Fit a new gauge in the reverse order.
Open all valves and fill the system as described in Section 16.

8. Domestic Hot Water Heat Exchanger

Check that the electricity and mains water supplies have been turned off.
Remove the appliance front panel, top panel and withdraw the burner to prevent water ingress.
Drain the boiler and approximately 1 litre of water from the Heatslave tank using the drain point provided at the bottom front face of the tank. This will prevent excessive residual spillage from the pipework when disconnecting.
Close the mains water isolating valve located on the flow switch inlet pipe. Undo the compression fitting connecting the flow switch to the isolating valve. Undo the union nut connecting the flow switch to the heat exchanger and remove the flow switch assembly.
Drain the residual water from the hot water pipework and undo the union nut connecting the pipework to the heat exchanger.
Undo the two remaining union nuts located on the domestic hot water heat exchanger.
Take care not to lose any of the four tap washers and replace any which are damaged.
Withdraw the heat exchanger and fit a replacement in the reverse order.
Open all valves and fill the system as described in Section 16.
NOTE: It may be advantageous to use a tap spanner when undoing the heat exchanger union nuts.

9. Flow Switch. (See Fig 24)

Check that the electricity supply and mains water supplies are turned off.
To replace the Flow Switch proceed as follows:
NOTE: Do not replace individual components of the Flow Switch, it must be replaced as a whole unit.
Remove the appliance front panel, top panel and withdraw the burner to prevent water ingress.
Remove the control box top cover.
Remove the proximity switch connector plug at **X6** on the control board.
Remove the proximity switch Heyco bush from the control box and withdraw the electrical lead.
Close the mains water isolating valve located on the flow switch inlet pipe and drain the residual water from the hot water pipework.
Undo the nut connecting the flow switch to the domestic inlet pipe assembly.
Undo the nut connecting the flow switch to the regulator compression fitting.
NOTE: While undoing these nuts it is essential that the brass section of the flow switch body is used for holding and not the plastic moulding.
Pull the nuts back and extract the flow switch assembly.
Fit a new flow switch and new washers in the reverse order, ensuring that the flow switch body is tilted up at an angle of approximately 15 degrees with the plastic moulding towards the boiler body.
To replace the flow restrictor (12/14 and 15/19 appliances only), remove the flow switch body as described above.
The flow restrictor is now accessible in the end of the regulator compression fitting.
Clean or replace the flow restrictor as required.
To gain access to the filter, undo the nut connecting the domestic inlet pipe assembly and the isolating valve.
Remove the domestic inlet pipe assembly.
Clean or replace the filter as required.
Reassemble the components in the reverse order.

10. Automatic Air Vent

Check that the electrical supply has been turned off.
Remove the appliance front panel, top panel and withdraw the burner to prevent water ingress.
Remove the electrical control box as described in Section 19.2 (11).
Drain the boiler and the heatslave tank..
Unscrew the automatic air vent and fit a new one in the reverse order.
Fill the system as described in Section 16.

11. Electrical Control Box

NOTE: It may be found easier to gain access to some components such as the diverter valve by removing the electrical control box as described here.
Check that the electrical supply has been turned off.
Remove the appliance front panel and top panel.
Remove the fire valve if fitted to the fire valve clip provided on the back of the electrical control box.
Remove the control box top cover by removing the four self tapping screws.
Unscrew the wing nut holding the electrical control box base onto the support arm and remove the screw.
Remove the split pins and phial retaining plug from the boiler and Heatslave tank thermostat phial pockets. Carefully withdraw the thermostat phials ensuring that the copper capillary tubes do not become kinked.
Slacken the two self tapping screws on the underside of the electrical control box holding the facia panel in place.
Remove the three self tapping screws holding the facia panel and electrical control box onto the side panels.
Unplug the burner electrical harness from the underside of the control panel.
Carefully withdraw the control box and temporarily seat in a suitable place such as the top of the boiler.
Reasemble the electrical control box in reverse order

12. Thermostats

Check that the electrical supply has been turned off.
Remove the appliance front, top panel.
Remove the electrical control box top cover by removing the four self tapping screws.

CENTRAL HEATING CONTROL THERMOSTAT

Remove the split pin from the thermostat phial pocket located on the front, left hand side of the boiler.
Carefully withdraw the thermostat phial from the pocket.

Remove the heyco split bush and slide the copper capillary tube through the slot, freeing the capillary tube from the electrical control box.
Remove the spade connectors and note the terminal positions of the various wires. See Fig 16.
Pull the thermostat control knob off the spindle and remove the central clamping nut and washer.
Remove the thermostat and replace with a new one using the reverse procedure.
With the thermostat in position, the excess capillary must be coiled (without tight bends) and positioned so that it does not come into contact with any hot surface.
When reassembling the split bush the slit should be positioned opposite to the slot on the electrical control box.
The thermostat phial should be checked to ensure that it is clean and free of any debris that would otherwise cause poor thermal conduction when placed in the phial pocket. Ensure that the split pin is replaced to prevent the phial springing free of the pocket during operation.

DOMESTIC HOT WATER CONTROL THERMOSTAT

The domestic hot water thermostat phial is located on the front face of the Heatslave tank. In all other respects the removal procedure is the same as the central heating control thermostat.

BOILER HIGH LIMIT THERMOSTAT

The high limit thermostat phial is located in the same pocket as the central heating control thermostat.
To remove the thermostat follow the same procedure as the central heating control thermostat, but to remove the body from the electrical control box, undo the two M4 screws located at the rear of the panel.
NOTE: The high limit thermostat phial should be positioned in the phial pocket before the central heating control thermostat phial.

MANUAL RESET OVERHEAT THERMOSTAT

Remove the phial retaining plug from the thermostat phial pocket located next to the electrical control box support bracket.
Carefully withdraw the thermostat phial from the pocket.
Remove the heyco split bush and slide the copper capillary tube through the slot, freeing the capillary tube from the electrical control box.
Remove the electrical spade connectors and undo the securing nut located on the underside of the electrical control box.
Remove the thermostat and replace with a new one using the reverse procedure.
With the thermostat in position, the excess capillary must be coiled (without tight bends) and positioned so that it does not come into contact with any hot surface.
When reassembling the heyco split bush the slit should be positioned opposite to the slot on the electrical control box.
The thermostat phial should be checked to ensure that it is clean and free from any debris that would otherwise cause poor thermal conduction when placed in the phial pocket.
Ensure that the phial retaining plug is replaced to prevent the phial springing free of the pocket during operation.

13. Control Board

Check that the electrical supply has been turned off.
Remove the appliance front, top panel and the control box top cover.
Remove the two screws holding the facia to the underside of the electrical control box and the two screws holding the facia to the side panels.
Remove the wires from terminals **X1** and **X2** and unplug the wiring harness connectors.
Gently prise back the support pillar locating tabs, one by one, and pull the control board clear.
Withdraw the board from the control box.
Fit a new control board in the reverse order.

14. Operating Switch

Check that the electricity supply has been turned off.
Remove the appliance front, top panel and the control box top cover.
Remove the two screws holding the facia to the underside of the electrical control box and the two screws holding the facia to the side panels. Remove the MAINS ON and LOCKOUT indicator light connectors from terminals **X9** and **X11** on the control board.
Remove the spade connectors from the domestic hot water central heating control thermostat and operating switch noting their positions. See Fig 16.
Depress the operating switch locking tabs behind the facia and remove the operating switch and replace in reverse order.

15. Programmer (where fitted)

Check that the electricity supply has been turned off.
Remove the appliance front, top panel and the control box top cover.
Remove the two screws holding the facia to the underside of the electrical control box and the two screws holding the facia to the side panels. Remove the MAINS ON and LOCKOUT indicator light connectors from terminals **X9** and **X11** on the control board.
Remove the spade connectors from the domestic hot water and central heating control thermostat noting their positions. See Fig 16.
Unplug the programmer from the control board and carefully remove the facia from the cabinet assembly.
Remove the four pozi-drive screws holding the programmer to the housing and withdraw the programmer.
Fit a replacement programmer in the reverse order having first set the switch on the rear of the unit to P. as described in the fitting instructions.
Use only the specified programmer. Do not attempt to fit any other model or make.

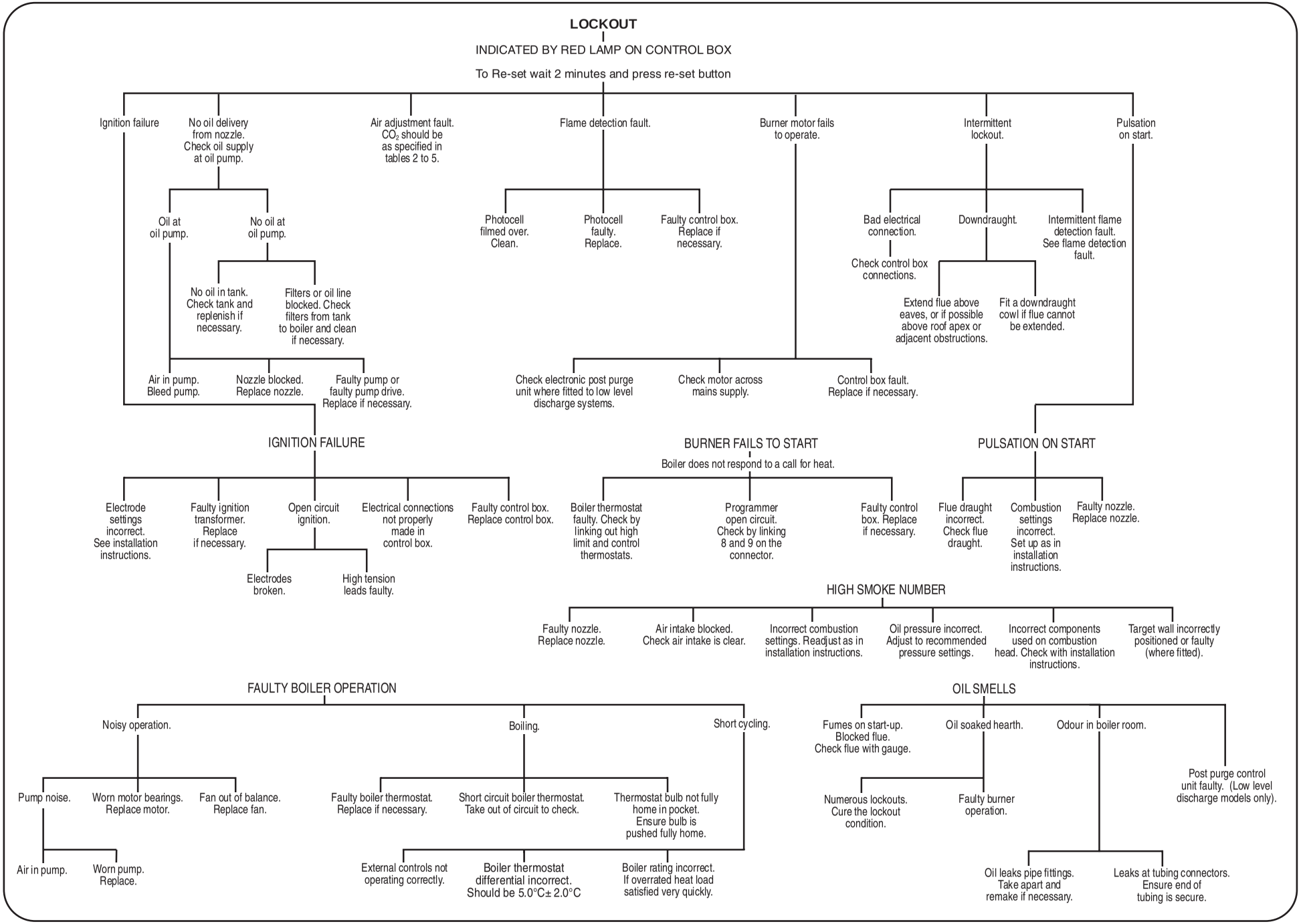
16. Baffles

For replacement of boiler baffles see Section 18.6.

20. Short Parts List

Burner Components – Electro Oil

Part		Manufacturers Reference	Qty	WHS Part No.
Burner Control 1.	Box	Satronic TF830.2B	1	8 716 142 781
	Photocell	Satronic MZ770	1	8 716 142 735


LOCKOUT
INDICATED BY RED LAMP ON CONTROL BOX
To Re-set wait 2 minutes and press re-set button
Ignition failure
No oil delivery from nozzle. Check oil supply at oil pump.
Air adjustment fault. CO_2 should be as specified in tables 2 to 5.
Flame detection fault.
Burner motor fails to operate.
Intermittent lockout.
Pulsation on start.
Oil at oil pump.
No oil at oil pump.
No oil in tank. Check tank and replenish if necessary.
Filters or oil line blocked. Check filters from tank to boiler and clean if necessary.
Air in pump. Bleed pump.
Nozzle blocked. Replace nozzle.
Faulty pump or faulty pump drive. Replace if necessary.
Photocell filmed over. Clean.
Photocell faulty. Replace.
Faulty control box. Replace if necessary.
Check electronic post purge unit where fitted to low level discharge systems.
Check motor across mains supply.
Control box fault. Replace if necessary.
Bad electrical connection.
Check control box connections.
Downdraught.
Extend flue above eaves, or if possible above roof apex or adjacent obstructions.
Fit a downdraught cowl if flue cannot be extended.
Intermittent flame detection fault. See flame detection fault.
IGNITION FAILURE
Electrode settings incorrect. See installation instructions.
Faulty ignition transformer. Replace if necessary.
Open circuit ignition.
Electrodes broken.
High tension leads faulty.
Electrical connections not properly made in control box.
Faulty control box. Replace control box.
BURNER FAILS TO START
Boiler does not respond to a call for heat.
Boiler thermostat faulty. Check by linking out high limit and control thermostats.
Programmer open circuit. Check by linking 8 and 9 on the connector.
Faulty control box. Replace if necessary.
PULSATION ON START
Flue draught incorrect. Check flue draught.
Combustion settings incorrect. Set up as in installation instructions.
Faulty nozzle. Replace nozzle.
HIGH SMOKE NUMBER
Faulty nozzle. Replace nozzle.
Air intake blocked. Check air intake is clear.
Incorrect combustion settings. Readjust as in installation instructions.
Oil pressure incorrect. Adjust to recommended pressure settings.
Incorrect components used on combustion head. Check with installation instructions.
Target wall incorrectly positioned or faulty (where fitted).
FAULTY BOILER OPERATION
Noisy operation.
Pump noise.
Air in pump.
Worn pump. Replace.
Worn motor bearings. Replace motor.
Fan out of balance. Replace fan.
Boiling.
Faulty boiler thermostat. Replace if necessary.
Short circuit boiler thermostat. Take out of circuit to check.
Thermostat bulb not fully home in pocket. Ensure bulb is pushed fully home.
Short cycling.
External controls not operating correctly.
Boiler thermostat differential incorrect. Should be 5.0°C± 2.0°C
Boiler rating incorrect. If overrated heat load satisfied very quickly.
OIL SMELLS
Fumes on start-up. Blocked flue. Check flue with gauge.
Oil soaked hearth.
Numerous lockouts. Cure the lockout condition.
Faulty burner operation.
Odour in boiler room.
Oil leaks pipe fittings. Take apart and remake if necessary.
Leaks at tubing connectors. Ensure end of tubing is secure.
Post purge control unit faulty. (Low level discharge models only).

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Bosch Group

Worcester Heat Systems Limited, Cotswold Way, Warndon, Worcester WR4 9SW.
Telephone: (01905) 754624 Fax: (01905) 754619

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All goods sold are subject to our official Conditions of Sale, a copy of which may be obtained on application.

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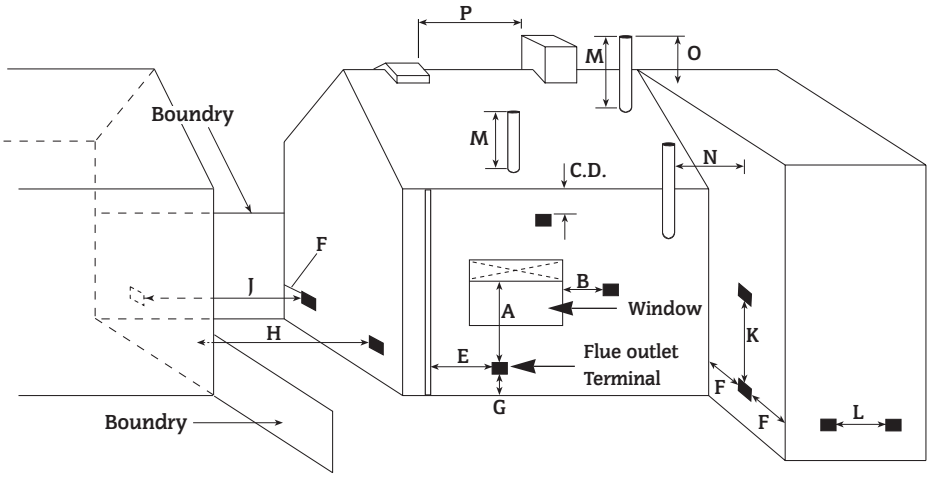
AMENDMENT SHEET TO MEET THE REQUIREMENTS OF AMENDED BUILDING REGULATIONS DOCUMENT J

THE FIGURES, INFORMATION & DIAGRAMS INCLUDED IN THIS AMENDMENT SHEET SHOWN HERE & OVERLEAF SUPERSEDE THOSE GIVEN IN THE ACCOMPANYING LITERATURE

TERMINAL POSITIONS

The following distances should be applied to the positioning of terminals in relation to other terminals and openings in dwellings.

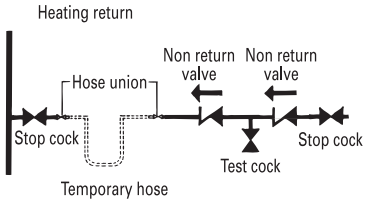
NOTE: The dimensions given are for general guidance only. Other surrounding buildings or objects may affect the clearance of combustion products. An alternative flue terminal position should be sought when there is any possibility of a nuisance being caused by inadequate dispersal of flue products.
Terminals should be positioned so as to avoid products of combustion entering into buildings.



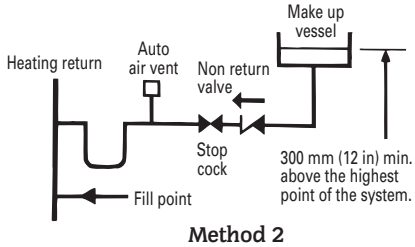
Terminal Position		Minimum Distance (mm) Open Flue	Low-Level Discharge	Vertical Balanced Flue
A	Directly below an opening, air brick, window, etc	Not allowed	600	Not allowed
B	Horizontally to an opening, air brick, window, etc.	Not allowed	600	"
C	Below a gutter or sanitary pipe if combustible material protected.	Not allowed	75	"
D	Below a balcony, eaves, gutter or drainage without protection to combustible material.	Not allowed	600	"
E	From vertical sanitary pipework..	Not allowed	300	"
F	From an internal or external corner or boundry along side terminal.	Not allowed	300	"
G	Above ground or balcony level.	Not allowed	300	"
H	From a surface or boundry facing the terminal.	Not allowed	600	"
J	From a terminal facing the terminal.	Not allowed	1200	"
K	Vertically from a terminal on the same wall.	Not allowed	1500	
L	Horizontally from a terminal on the same wall.	Not allowed	750	"
M	Above an intersection with the roof.	600	Not applicable	732
N	From a vertical structure on the side of the terminal.	750	Not applicable	750
O	Above a vertical structure less than 750mm from the side of the terminal.	600	Not applicable	732
P	From a ridge terminal to a vertical structure on the roof.	1500	Not applicable	Not applicable

SYSTEM FILLING & MAKE UP FOR SEALED SYSTEM APPLIANCES

The system filling and make up diagram below supersedes the diagram in the Installation and Servicing Instructions.



Method 1



Method 2

WORCESTER
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RS FLUE TERMINAL KIT

FOR USE ON ALL DANESMOOR ROOM SEALED
BF OIL-FIRED APPLIANCES

INSTALLATION INSTRUCTIONS

THESE INSTRUCTIONS APPLY IN THE UK ONLY

THESE INSTRUCTIONS ARE TO BE LEFT WITH THE APPLIANCE

1. General

It is essential that the boiler is commissioned and serviced by a competent engineer.

Worcester Heat Systems Limited will be pleased to offer regular servicing arrangements and a comprehensive maintenance contract. Alternatively, the Oil Firing Technical Association for the Petroleum Industry (OFTEC) will be able to advise on OFTEC trained and registered engineers.

The balanced flue terminal has been designed to discharge the products of combustion without the need for a conventional chimney. The terminal includes a sound absorbing material, to remove excess noise produced during combustion, and an air inlet grille.

The terminal is produced in two different lengths to accommodate both single skin walls up to 180 mm thick and cavity/thicker walls up to 327 mm. It should be noted that where flue noise may be a problem the longer terminal should be used with the appliance set back from the wall, sufficient to accommodate the extra terminal length in the wall.

Note: It is a mandatory requirement of the Building Regulations that only 28 second kerosene is used on low level discharge flues. Under no circumstances may 35 second gas oil be burnt.

2. Flue Terminal Position

IMPORTANT

In addition to the following notes, reference must be made to the appliance Installation and Servicing Instructions.

It is absolutely essential to ensure that, in practice, products of combustion discharging from the flue terminal cannot re-enter the building or any other adjacent building through ventilators, windows, doors, other sources of natural air infiltration, or forced ventilation/air conditioning. If this eventually should occur, the appliance must be immediately turned off and the system rectified.

3. Flue Extension

Where the wall thickness exceeds 327 mm the flue length can be extended by the use of up to two extension kits. The use of one extension kit will allow for a wall up to 638 mm thick and two kits up to 952 mm. Full installation instructions are included with the extension kit.

Fig. 1. Flue Terminal Assembly.

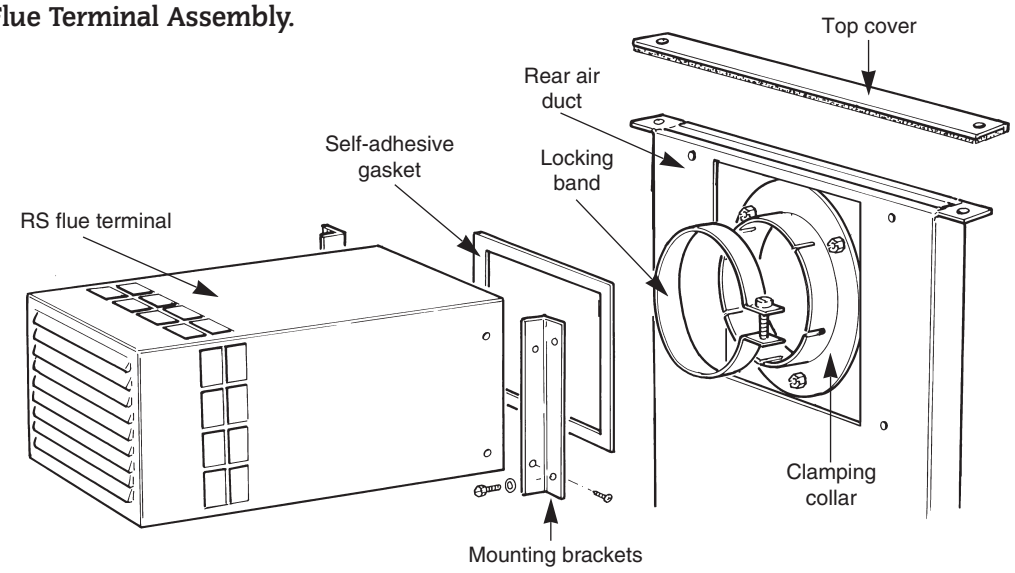


Fig. 2. Rear Flue Outlet Seal.

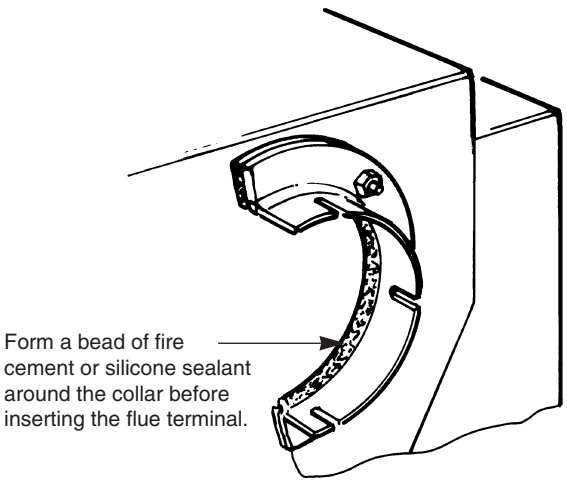
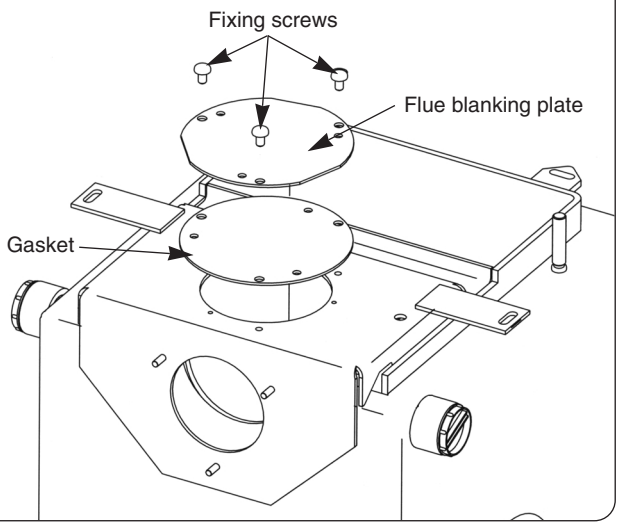


Fig. 3. Flue Blanking Arrangement.



4. Low Level Flue Terminal Installation

4.1 Remove the rear air duct top cover by undoing the two screws.

4.2 Fit the locking band. (See Fig. 1).

1. Slide the locking band over the clamping collar ensuring that the screw head is pointing upwards to allow easy access when tightening.
2. Tighten the locking band screw sufficiently to prevent it slipping out of position. Do not overtighten at this stage as this will make it difficult to insert the terminal later.

4.3 Prepare the terminal.

1. Fasten the two terminal mounting brackets onto the terminal using the four No. 6 x 10 mm screws supplied. The bracket should extend approximately 1 mm beyond the rear face of the terminal.
2. Remove the peel-off backing from the self-adhesive terminal gasket and carefully stick it onto the rear face of the terminal.

4.4 Cut a 170 mm square hole in the wall in the required location.

4.5 Mount the terminal.

1. Place a fillet of fire cement or silicone sealant around the inside of the clamping collar as shown in Fig. 2.
   The flue terminal may be mounted with the boiler positioned close to the hole in the wall or with the boiler in a remote position.
   Where the terminal is to be mounted in close proximity to the wall proceed as follows, otherwise follow from step 4.
2. Push the terminal through the hole in the wall sufficiently to allow the terminal to be supported. Ensure that the terminal is the correct way up such that the louvres are pointing downwards and the drain holes are on the underside.
3. Position the appliance so that the clamping collar is in line with the hole centre and the rear of the appliance is approximately 200 mm from the wall.
4. Insert the terminal spigot into the clamping collar. This will be found easier by repeatedly twisting the terminal clockwise then anti-clockwise until the gasket is seated against the rear air duct.
5. With the terminal seated squarely, insert the four M5 x 10 mm bolts/washers and fully tighten using a short screwdriver or spanner.
6. Fully tighten the clamping collar.
7. Refit the rear air duct top cover.
8. Smooth the fire cement/silicone sealant around the inside of the clamping collar to form a good seal and remove any surplus.
9. Blank the top flue hole using the blanking disc as shown in Fig. 3.

4.6 Push the appliance back into the prepared hole until it is hard up against the wall. See Fig. 4a.

4.7 Check that the air intake holes are clear of the wall by at least 15 mm and ensure there is no debris blocking the holes. See Fig. 4a.

4.8 To prevent rain running back into the terminal, it is recommended that the terminal exit slopes downwards away from the appliance by a few degrees. This can be achieved by holding the terminal down at the external end and placing packing material between the top side of the terminal and the wall, inside the hole. Check the slope using a spirit level!

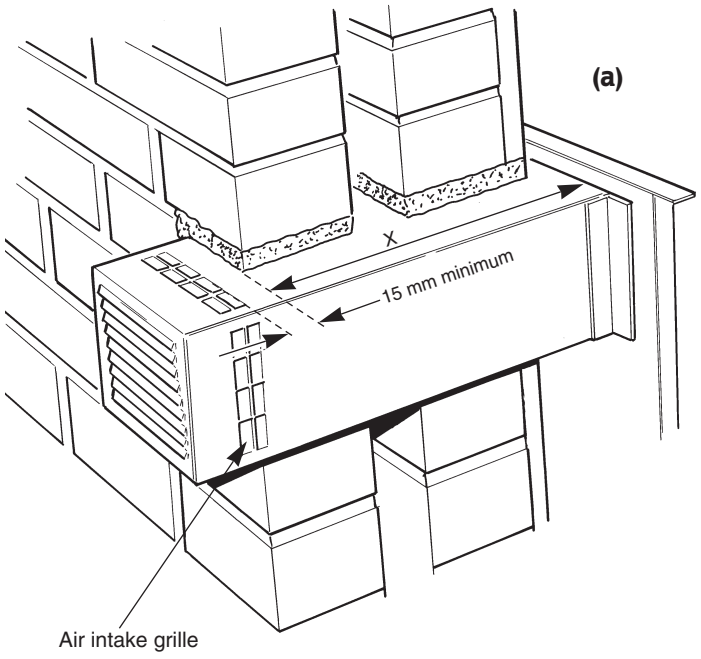
4.9 Cement the flue terminal in position and make good the surrounding masonry. Ensure that no cement drops into the air intake holes!

4.10 Where the terminal is fitted less than two metres above a surface to which people have access, fit a terminal guard as shown in Fig. 4.

A suitable guard is available from Worcester Heat Systems, Part number ZAGAS279, or alternatively a proprietary terminal guard may be used.

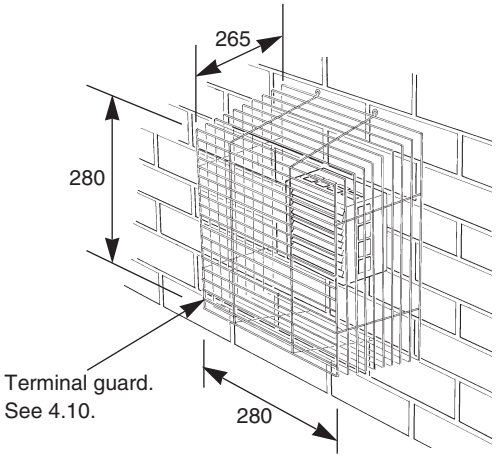
A proprietary terminal guard may be used provided it has the minimum dimensions shown in Fig. 4b. The guard should have suitable corrosion resistance due to the acidic content of the flue gases.

Fig. 4. Flue Terminal Installation.



4" to 7" Terminal X = 182 mm maximum
7" to 12" Terminal X = 327 mm maximum

(b) Terminal Guard Minimum Dimensions.



WORCESTER
Bosch Group

Worcester Heat Systems Ltd. (Bosch Group), Cotswold Way, Warndon, Worcester WR4 9SW.
Tel. 01905 754624 Fax. 01905 754619
www.worcester-bosch.co.uk

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WORCESTER
Bosch Thermotechnik

MULTI-DIRECTIONAL BALANCED FLUE KIT INSTALLATION INSTRUCTIONS

FOR USE ON DANESMOOR ROOM SEALED
B.F. OIL-FIRED APPLIANCES

THESE INSTRUCTIONS ARE TO BE LEFT WITH THE APPLIANCE

1. Important

1.1 These instructions should be read in conjunction with the relevant parts of the boiler Installation and Servicing Instructions, RS Flue Terminal Instructions and the RS Flue Extension Kit Instructions.

1.2 With this type of flue arrangement it is essential that the appliance is commissioned correctly by a qualified engineer. The correct combustion settings are detailed in the Technical Data section of the Installation and Servicing Instructions.

1.3 Careful consideration should be given to the location of the flue terminal with respect to flue noise and dispersion of combustion products. Refer to the boiler Installation Instructions.

2. General

2.1 The multi directional balanced flue kits are available in two types, low level (WHS Part No: ZAGAS256) and High level (WHS Part No: ZAGAS255). See Fig. 1.

2.2 The flue kits are designed to be used in conjunction with a standard 12 inch RS flue terminal (WHS Part No: ZAGAS212) or the shorter 7 inch version (WHS Part No: ZAGAS213). It is recommended that wherever possible the 12 inch terminal should be used, as this will give maximum flue noise reduction. All of the dimensions stated in these instructions assume a standard terminal. Where a short terminal must be used, subtract 145 mm from X in section 3.

2.3 The flue kit is able to discharge the products of combustion to the rear, or at 90 degrees, to the left or right of the appliance.

2.4 When fluing to the rear, the unit will fit into any wall up to a thickness of 453 mm. However, should the wall thickness exceed 453 mm or the appliance require positioning further from the wall then this may be done using up to two Worcester RS Flue Extension Kits (WHS Part No: ZAGAS214).

2.5 The flue terminal louvered end cap can be removed to clean the horizontal flue by removing the screw on its base and pivoting the end cap forwards and upwards to release the tabs. Access to the vertical flue can be gained by removing the flue box lid (N). See Fig. 4.

3. Low-level Kit Installation

STANDARD 12 INCH TERMINAL

The flue kit must be fully assembled before fitting to the appliance.

3.1 Make a 170 mm square hole in the wall , for the flue terminal. The height of the hole centre should be 1023 mm from the appliance base.

3.2 Before positioning the appliance, the boiler rear flue outlet and rear air duct must be blanked off using the plates as shown in fig 2.

3.3 Undo the three nuts (F)and remove and discard the rear discharge clamping collar (B)and gasket (C). Replace these with the solid gasket (H) and blanking plate (G) and secure with the three nuts (F) ensuring the plate forms a good seal.

3.4 Apply a bead of silicone sealant (supplied) around the inner edge of the rear duct cover (E) and fix to the rear air duct using the four screws (D). Bed the fillet of silicone sealant into position and remove any excess.

3.5 Having decided the position of the appliance, measure the distance from the outside wall to the rear air duct (distance X Fig. 1a) for rear outlet, or to the side panel for a right/left outlet (distance Y fig 1b). For the side outlet calculate X = Y + 93 mm.

3.6 If X is greater than 453 mm then an extension kit must be fitted. Two will be required if X is greater than 768 mm, allowing a maximum of X = 1081 mm. When fitting an extension kit remove items 1,2,3 Fig.3 and re-fit to the air duct elbow to allow the extension to seal against the duct. Follow the relevant parts of the RS extension kit instructions.

3.7 The terminal must be fitted so that the wall does not overlap the line indicated on the warning label (i.e. 15 mm back from the air inlet holes) and such that there is at least 50 mm clearance between any part and the terminal guard. The guard is 260 mm deep and will therefore allow the kit to be fitted without cutting the flue tube (R) where X = 347 to 453 mm for the standard kit, X = 662 to 768 mm when one extension section is used and X = 975 to 1081 mm when two extension sections are used.

3.8 Where X is less than 347 mm using the standard kit, 662 mm using one extension section, 975 mm using two extension sections or the terminal is to be set back as far as possible, to give the best appearance, then the aluminium flue tube should be cut to the required length as described in 3.13 to 3.14.

3.9 Remove the duct cover (M). See Fig. 4.

3.10 Pull the insulation off the flue tube (R) and remove the flue box/tube assembly (O and R) by pulling upwards and waggling from side to side. Check that the locking bands (P) and (Q) are slack before removing the flue box!

3.11 Remove the flue box lid (N). Note: the two retaining screws are held captive to the lid to prevent them dropping into the air duct. Undo each screw alternately, a little at a time, to prevent bending the lid.

3.12 Remove the flue tube (R).

3.13 To shorten the flue tube (R) remove its insulation and cut off a length l = 453-X for the standard kit, l = 768-X when using 1 extension kit and l = 1081-X when using 2. (See fig 4a).

3.14 Cut the same length l from the insulation and replace it on the flue tube. **Note:** It is very important that the insulation is properly fitted and firmly held in place with the securing straps as shown, otherwise excessive heat will cause problems with the burner control box.

3.15 Place a bead of silicon sealant around the flue terminal spigot (U) and push the clamping end of the flue tube (R) over, until fully seated. Tighten the locking band (T) ensuring the tube is parallel to the terminal body.

3.16 To change the direction of the flue system remove the four screws holding the air duct elbow (S) to the base (V) and refit in the required direction.

3.17 Seal the air duct to the base (V) using a bead of silicon sealant (supplied). If the terminal is installed to the left or right remove the front and rear hole bungs first and replace in the unused holes.

3.18 Apply a bead of silicon sealant around the inside of both clamping collars on the flue box (O).

3.19 Replace the flue box (O) in the required direction and push fully down. Ensure the locking band (P) is positioned with the screw facing forwards as shown but do not tighten at this stage.

3.20 Ensure the locking band (Q) is positioned with the screw facing upwards.

3.21 Insert the flue tube/terminal assembly (R, T and U) into the air duct and push fully back into the flue box clamping collar. Ensure that the terminal louvered outlet is pointing downwards as shown.

3.22 Tighten locking bands (P) and (Q) and smear the silicon sealant, inside the flue box (O), to seal the flue tubes and remove any excess.

3.23 Replace the flue box lid (N).

3.24 Seal around the flue terminal and the air duct using the sealing tape supplied as shown in fig 4b.

3.25 Undo the two screws (L) holding the rear air duct top cover (A) and discard the cover. See Fig. 2. Save the screws to fasten the air duct base (V) in place.

3.26 Fix the self adhesive duct gasket (K) to the top of the rear air duct (Z) and the flue collar gasket (J) to the underside of the flue collar (W).

3.27 Feed the flue terminal assembly through the hole in the wall and carefully sit the balanced flue kit on top of the boiler flue outlet plate. See fig 2. Note: Take care not to damage the seals!

3.28 Loosely fit the three stainless steel bolts (I) into the flue collar assembly from beneath the boiler flue outlet plate. See Figs 2 and 4.
3.29 Align the two rear air duct (Z) holes with those on the air duct base (V) and loosely fit the two posidrive screws (L). Check that the seals are properly located.
3.30 Fully tighten the three stainless steel bolts (I) on the under side of the flue outlet plate and then the two screws (L).
3.31 Check that the terminal air intake holes are clear of the wall by at least 15 mm and ensure there is no debris blocking the holes.
3.32 To prevent rain running back into the terminal, it is recommended that the terminal exit slopes downwards by a few degrees. This can be achieved by holding the terminal down at the external end and placing packing material between the top side of the terminal and the wall, inside the hole. Check the slope using a spirit level !
3.33 Cement the terminal in position and make good the surrounding masonry. Ensure that no cement drops into the air intake holes!
3.34 Refit the duct cover (M).
3.35 Fit the terminal guard, where the terminal is fitted less than 2 metres above a surface to which people have access, as shown in the terminal kit instructions.

4. High-level Kit Installation

STANDARD 12 INCH TERMINAL
4.1 The high level kit is exactly the same as the low level kit except that the terminal height has been increased by the addition of a vertical extension section. See Fig.1.
4.2 To install the high level kit follow section 3 but at, 3.1 the hole centre should be at a height of 2053mm and to change the direction to left or right hand at stage 3.16, remove the four screws holding the air duct elbow (S) to the top of the vertical air duct and refit in the required direction.
4.3 Seal the air duct elbow (S) to the vertical extension duct on the **inside**, and the bottom of the vertical duct to the air duct base (V), using a bead of silicon sealant (supplied).
REDUCING THE TERMINAL HEIGHT
4.4 The high level kit is designed to discharge the flue gases at a fixed nominal height of 2 metres from ground level. It is strongly recommended that the kit is installed as supplied. However, should it prove impossible to install the terminal at this height then the vertical section may be shortened as follows.
4.5 Measure the site and decide the amount of vertical section to remove (h).
4.6 Remove the square vertical air duct and mark a cut line around all four sides at a distance (h) from the bottom of the duct.
4.7 Mark the new position of the four screw holes 10 mm above the cut line.
4.8 Carefully cut the duct, using a hacksaw, following the four lines to ensure the duct is square at the bottom.
4.9 Drill the four mounting holes using a 4 mm drill bit.
4.10 Cut the vertical flue tube insulation at a distance (h) from the top using a sharp knife.
4.11 Remove the Flue box (O) and cut the aluminium flue tube at a distance (h) from the top of the flue tube. Ensure the tube is cut square!
4.12 Re-assemble the system and install as described above.
Note: It is very important that the insulation is properly fitted and firmly held in place with the securing straps, otherwise excessive heat will cause problems with the burner control box.

5. Cabinet Top Panel

5.1 The top panel is supplied with a blanking plate fitted.
5.2 To convert the panel for use with a high-level kit remove the blanking plate and the rear section of insulation and replace with the white flue embellishment supplied with the multi-directional flue kit.

Fig. 1. Measuring the kit length.

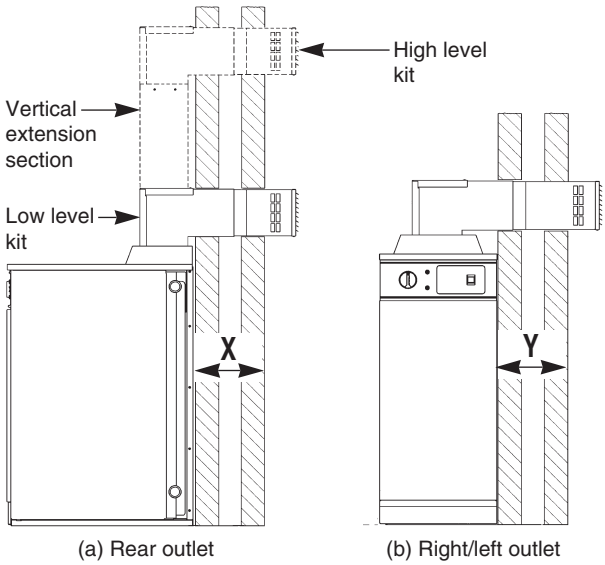


Fig. 2. Rear flue blanking/mounting the kit

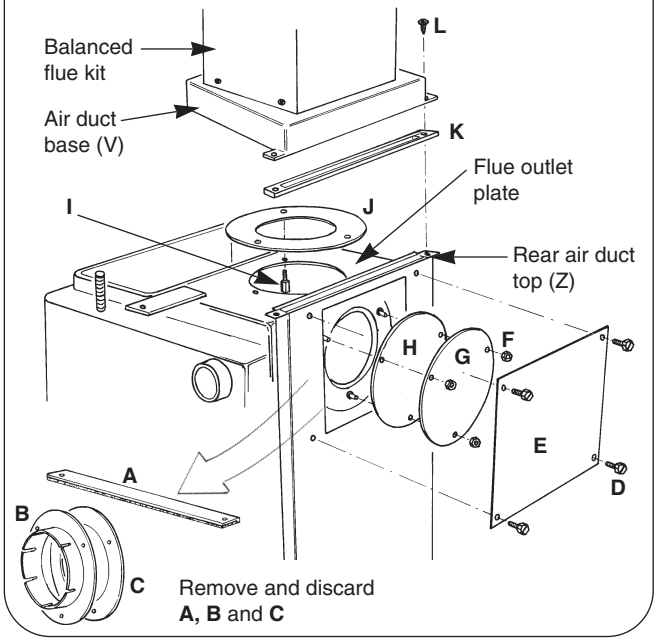
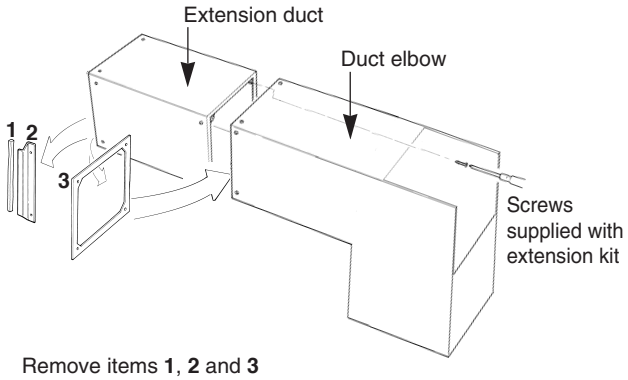
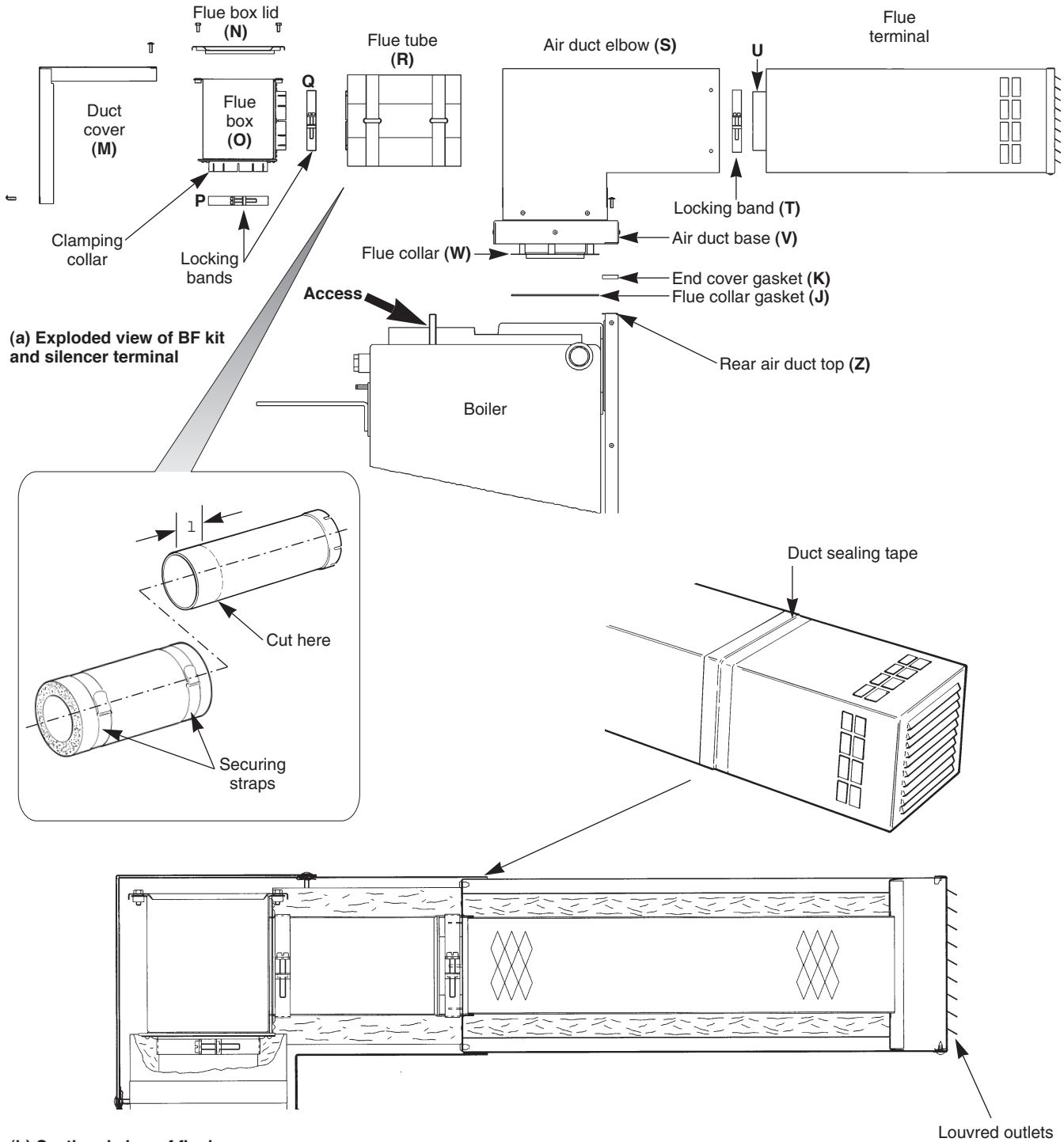


Fig. 3. Single extension.



Remove items **1**, **2** and **3** from the extension duct and fit into the duct elbow.

Fig. 4. Assembly.



WORCESTER
Bosch Thermotechnik

Worcester Heat Systems Limited, Cotswold Way, Warndon, Worcester WR4 9SW.
Telephone: (01905) 754624 Fax: (01905) 754619

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WORCESTER

Bosch Group

TWIN CHANNEL PROGRAMMER FITTING AND OPERATING INSTRUCTIONS

General information is given in the users instruction leaflet despatched with the appliance and/or on the lighting instruction plate fitted to the appliance.

CONFORMS TO THE ESSENTIAL REQUIREMENTS OF THE FOLLOWING DIRECTIVES:

89/336/EEC – ELECTROMAGNETIC COMPATIBILITY

73/23/EEC – LOW VOLTAGE DIRECTIVE

CE

THESE INSTRUCTIONS APPLY IN THE UK ONLY

THESE INSTRUCTIONS ARE TO BE LEFT WITH THE USER OR AT THE APPLIANCE

Gas Safety (Installation and Use) Regulations 1984: All gas appliances must be installed by a competent person, in accordance with the above regulations. Failure to install the appliance correctly could lead to prosecution. The manufacturers notes must not be taken, in any way, as overriding statutory obligations.

WARNING: This appliance must be earthed and protected by a 3A fuse if a 13A plug is used, or, if any other type of plug is used, by a 5A fuse either in the plug or adaptor or at the distribution board.

IMPORTANT: To get the best from your Worcester appliance please read these instructions carefully.

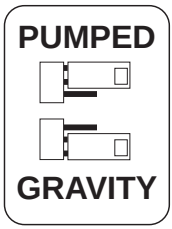
PROGRAMMER

7 Day Twin Channel Timeswitch. Maintenance: User maintenance should not be attempted.

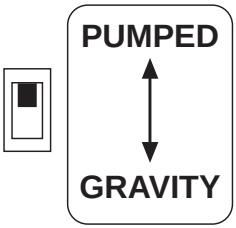
Switch Rating: 2(10A 240V Supply Voltage 220-240 ac 50Hz).

If you have a fully **P**UMPED and controlled system you can have central heating without hot water and vice versa. A **G**RAVITY fed hot water system does not permit the heating to be on without hot water. It is possible to have hot water without the heating.

Set the switch or selector on the back of the programmer to **P** or **G** according to the type of system.



Selector



Switch

TO FIT PROGRAMMER

WARNING: Disconnect the electrical supply at the mains and turn off the gas supply at the service cock before commencing any work.

Access must be gained to the rear of the facia as described in the appliance instruction book.

Unplug the operating switch from the 4-way terminal block. Remove the operating switch mounting panel from the facia by unscrewing the four nuts, two at the top and two at the bottom.

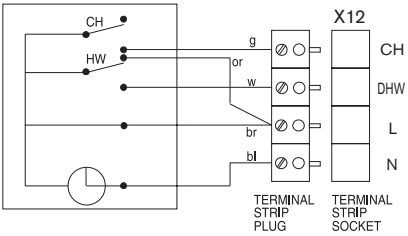
Fit the programmer assembly in the reverse order, carefully tightening the fixing nuts. Plug in the programmer connection into the 4-way terminal block. Check that the plug-in terminal block is properly aligned before making the connection.

TO REPLACE THE PROGRAMMER

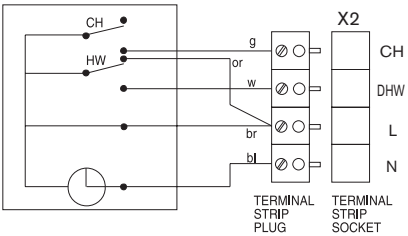
Follow the preceding instructions if it is necessary to replace the programmer.

ELECTRICAL CONNECTIONS

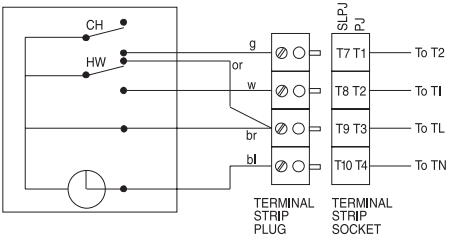
Highflow 400



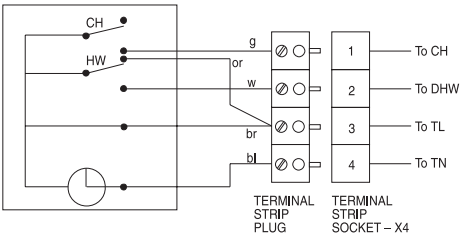
Highflow 400 Electronic



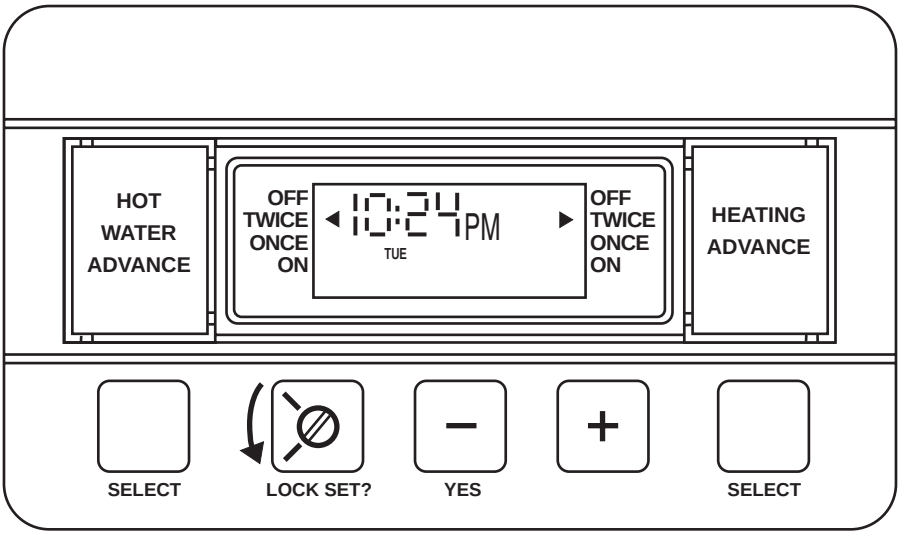
Danesmoor Oil Boiler



Oil Heatslave



OPERATION OF CONTROLS



The programmer controls the hot water and central heating functions independently.

When a **CENTRAL HEATING** programme is selected, the appliance will operate at times dictated by the programmer in response to the system controls.

When the **HOT WATER** programme is selected the appliance will operate whenever a demand for hot water is made within the setting of the programmes.

PROGRAMMER OPERATING INSTRUCTIONS

Check that the gas supply to the appliance is **OFF** and that the room thermostat, if fitted, is at minimum to prevent accidental operation of the appliance during the initial setting of the programmer. It is not necessary to do this when making adjustments to the programme at a later date.

Switch on the electricity supply.

Select **OFF** by pressing the **SELECT** button until the arrow appears next to **OFF** on the display.

Release the lock screw to alter the programmer settings. Set the lock screw after any alterations.

Press and release the **SET** and + buttons simultaneously to get the display **Mon – 12.00 – AM.**

To Set the Clock

Press **SET** and **SET CLOCK?** will appear.

Press **YES** and **TIME** and **DAY** will appear. The day will flash.

Press – and + buttons to alter the day.

Press **SET** to enter the day. The Hours will flash.

Press – and + buttons to alter the hour.

Press **SET** to enter the hour (with the correct **AM** or **PM**). The minutes will flash.

Press – and + buttons to alter the minutes.

Press **SET** to enter the minutes.

The display will show **SET PROG?** – See Changing the Programme.

Press **SET** and **TEST?** will appear – See Programme Test.

Press **SET** and **SET H'DAY?** will appear – See Holiday Setting.

Press **SET** and the **DAY** and **TIME** display will appear.

If the programme is left in the programming mode it will automatically revert to the normal mode after a period of 1 to 2 minutes.

Do not forget to re-set the clock when the British Summer Time changes are required.

Standard Programme

The programmer has an in-built programme of "standard" switching times shown in the table. These may be changed to suit your specific requirements.

SWITCHING	STANDARD PROGRAMME			
	Mon.-Fri.		Sat.-Sun.	
	CH	HW	CH	HW
ON1	6.30 a.m.	6.30 a.m.	7.00 a.m.	7.00 a.m.
OFF1	8.30 a.m.	8.30 a.m.	9.00 a.m.	9.00 a.m.
ON2	4.30 p.m.	4.30 p.m.	4.00 p.m.	4.00 p.m.
OFF2	10.30 p.m.	10.30 p.m.	11.00 p.m.	11.00 p.m.

ON1 – Start of the first timed period of the day.
OFF1 – End of the first timed period.
ON2 – Start of the second (evening) period.
OFF2 – Final shut down for each day (up to 23hr 50min after ON1).

Changing the Programme

Check that the time is correctly set before changing the programme.

Press **SET** until **SET PROG?** appears.

Press **YES** until Time, Monday-Friday, **CH ON** appears.

NOTE: If you press **SET** after each operation of **YES** you advance that setting to its next stage i.e. Mon-Fri to each individual day or **CH** to **HW** etc.

You can now set the **CH** operating times for the Monday-Friday period.

Press – and + buttons to set the **CH ON** time in 10 minute steps.

Press **SET** to enter the **ON1** time. **OFF** will appear.

Press – and + buttons to set the **CH OFF** time.

Press **SET** to enter the **OFF1** time.

Continue and set the **ON2** and **OFF2** times.

HW appears.

Press **YES** to get **HW ON**.

Set **HW ON1** to **OFF2** as previously described.

When the **OFF2** time is entered **SET MON PROG** will appear.

You can now enter **CH** operating times for **MONDAY** only if required.
Press **YES** until Time, **ON** appears.
Press – and + buttons to set the time and continue as described in the preceding instructions to set **CH** and **HW**.
The final press of **SET** will change the day. Amend the times as required.
Continue until **SAT SUN** appears.
Set the **CH** and **HW** operating times for these two days as described in the preceding instructions.
It will then be possible to set specific times for **SATURDAY** or **SUNDAY** as required.
The final press of **SET** produces **TEST?** on the display.
Press **SET** (twice) and the **DAY** and **TIME** display will appear.
Enter the new programme times in the table following.

Central Heating

	ON1	OFF1	ON2	OFF2
Monday				
Tuesday				
Wednesday				
Thursday				
Friday				
Saturday				
Sunday				

Hot Water

	ON1	OFF1	ON2	OFF2
Monday				
Tuesday				
Wednesday				
Thursday				
Friday				
Saturday				
Sunday				

Programme Test
Press **SET** until **TEST?** appears.
Press **YES** and 12.00 **AM** on that particular day will appear.
Press and hold **YES** and the time display will run pausing for 2-3 seconds at each switching operation. The **CH** or **HW** indicator will be energised as appropriate.
Release the **YES** button to hold the switching time for longer than 2-3 seconds.
Press **YES** to continue the examination moving through each day of the week.
Press **SET** (twice) to return to the Day and Time display.

Holiday Setting

Press **SET** until **SET H'DAY?** appears.

Press **YES** and 00 will appear.

Press – and + buttons to set the number of days you require the system to be off.

Each pass through midnight counts as one day.

Press **SET** and **H'DAY** will appear. The system will countdown to zero and then return to normal settings.

To override the holiday setting press any button and normal operation will resume immediately.

If you wish to inspect a single days settings press **SET** to get **PROG?** followed by **YES** and **SET** to get the desired day. Press **YES** to display the times and then repeatedly press **SET** to progress through the settings of that day. Alter the times as desired remembering to press **SET** at the end. To return to the day and time display if no change to the programme is made repeatedly press **SET**.

The programme can be reset to the start-up display and the standard pre-set programme by pressing **SET** and + simultaneously. You will have to reset the clock and then enter the programme required following the preceding instructions.

Operational Notes

Programmer Flexibility

Switching options for **CH** and **HW** are:

- **OFF** – Off all the time.
- **TWICE** – On for two periods each day.
- **ONCE** – On for one period each day (**ON1** → **OFF2**).
- **ON** – On all the time.

Operate the **SELECT** button to move the arrow in the display to the option you require.

Mixing Once or Twice Options

To have your **CH** (Central Heating) or **HW** (Hot Water) Twice on some days but **ON** all day the others, first programme the "Twice" days in the normal manner. For the other days set **ON1** to the required switch-on time and then set **OFF1, ON2** and **OFF2** all at the same required switch-off time. Finally, set the **SELECT** button to Twice.

One Day Off Option

If you require the appliance to be off on a particular day, set the relevant **ON1** and **OFF1** to the same time and **ON2** and **OFF2** to the same later time on that particular day. Set the appropriate **SELECT** button to **ONCE** or **TWICE** as required.

Central Heating or Hot Water Shut Down

To shut down the **CH** (Central Heating) or, where appropriate, **HW** (Hot Water) without disturbing the programme, set the appropriate **SELECT** button to **OFF**.

Advance

If you wish to switch the central heating from **ON** to **OFF** or vice-versa, press and release the appropriate advance button. The regular programme will be automatically resumed as the later switching times are reached.

Advance does not operate if you have selected the **ON** or **OFF** options.

TO LIGHT AND STOP THE APPLIANCE

Refer to the user's operating instructions or the lighting instruction plate fixed to the appliance door panel, for detailed instructions on the lighting and operation of the appliance.

WORCESTER

Bosch Group

Worcester Heat Systems Ltd (Bosch Group), Cotswold Way, Warndon, Worcester WR4 9SW.
Telephone: 01905 754624 Fax: 01905 754619
Technical Helpline 08705 266241
www.worcester-bosch.co.uk

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